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Crustacea Decapoda : On a collection of Nephropidae from the Indian Ocean and Western Pacific

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ABSTRACT

Nephropidae collected by expeditions to several localities in the Indian and West Pacific oceans have been examined. One species of *Acanthacaris*, five species of *Metanephrops* and eight species of *Nephropsis* have been identified. In addition, a new species of *Metanephrops (M. mozambicus)* and two new species of *Nephropsis (N. acanthura* and *N. sulcata*) are described. A revision of the genus *Nephropsis* in the Indian and Pacific oceans is also provided.

RÉSUMÉ

Crustacea Decapoda : Sur une collection de Nephropidae de l'Océan Indien et du Pacifique occidental.

Plusieurs campagnes françaises dans les océans Indien et Ouest-Pacifique ont permis la récolte d'une espèce d'*Acanthacaris*, de cinq espèces de *Metanephrops* et de huit espèces de *Nephropsis*. Une espèce nouvelle de *Metanephrops (M. mozambicus)* et deux espèces nouvelles de *Nephropsis (N. acanthura* et *N. sulcata)* sont décrites. À l'occasion de cette étude, une révision de l'ensemble des espèces de *Nephropsis* des océans Indien et Pacifique est faite.

Metanephrops mozambicus sp. nov. se trouve dans le sud de l'océan Indien occidental ; il est proche de *M. andamanicus* (Wood Mason) de la mer d'Andaman et des Philippines avec lequel on l'a fréquemment confondu. Les deux espèces se différencient, entre autres, par la forme et l'ornementation de l'abdomen.

Nephropsis acanthura et *N. sulcata* spp. nov. se trouvent aussi bien dans l'océan Indien que dans l'Ouest-Pacifique. *N. acanthura* est proche de *N. occidentalis* Faxon de la côte occidentale d'Amérique, ces deux espèces étant les seules du genre à présenter une épine dorsale sur le telson ; elles se distinguent l'une de l'autre par, en particulier, la forme des pleurons. *N. sulcata* est très semblable à *N. atlantica* Norman, de l'Atlantique, dont elle se différencie principalement par le rostre et la longueur des articles des pérèiopodes.

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INTRODUCTION

In recent years the Institut français de Recherche scientifique pour le Développement en Coopération (ORSTOM) and the Muséum national d'Histoire naturelle, Paris, have carried out numerous cruises and taken samples in various areas of the Indian and West Pacific oceans : Madagascar (CROSNIER & JOUANNIC, 1973 ; VON COSEL, 1987), Central Indian Ocean (Cruise SAFARI II, MONNIOT, 1984), Philippines (Cruises MUSORSTOM 1, 2 and 3, FOREST, 1981, 1985, 1989), Indonesia (Cruise CORINDON I and 2, MOOSA, 1984), Chesterfield Islands (Cruise MUSORSTOM 5, RICHER DE FORGES *et al.*, 1986) and New Caledonia (Cruises BIOCAL, LÉVI, 1986, and BIOGEOCAL, COTILLON & MONNIOT, 1987 ; see also RICHER DE FORGES, this volume p. 9-54). These expeditions have furnished a varied and interesting collection of nephropid lobsters.

The family Nephropidae has been extensively studied in the Atlantic Ocean (HOLTHUIS, 1974). However, in the Pacific and Indian oceans, despite numerous papers (see below for references), a number of difficulties still remain unresolved. One species of *Acanthacaris* and five species of *Metanephrops* are studied herein. Futhermore, a revision of the genus *Nephropsis* in the Pacific and Indian oceans is presented.

The measurements given in this paper refer to carapace length including the rostrum. The terminology for the morphological characters used in the present study and the measurements applied, illustrated in Figure 1, were given by HOLTHUIS (1974).

The abbreviations for the institutions whose collections were used in this study are as follows :

BMNH : British Museum (Natural History). London.
MNHN : Muséum national d'Histoire naturelle, Paris.
RMNH : Rijksmuseum van Natuurlijke Historie. Leiden.
USNM : National Museum of Natural History (Smithsonian Institution). Washington.
ICM : Instituto de Ciencias del Mar. Barcelona.
CM : Cambridge Museum.
JCU : James Cook University. Queensland.

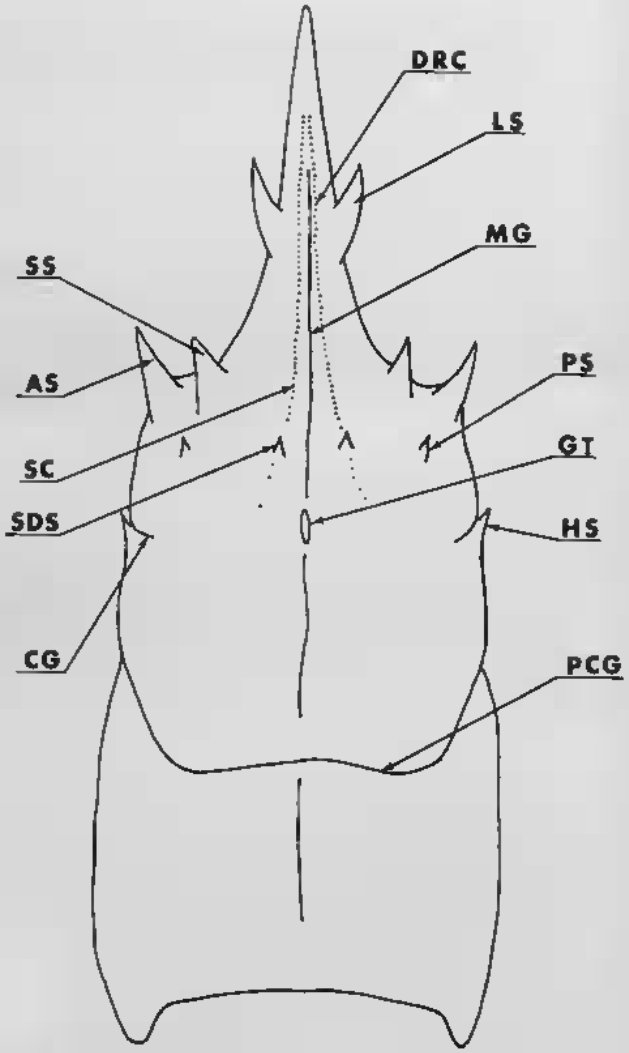

FIG. 1. — Schematic dorsal and lateral views of Nephropid carapace. AS : antennal spine ; CG : cervical groove ; DRC : dorsal rostral carina ; GT : gastric tubercle ; HS : hepatic spine ; LS : lateral spine ; MG : median groove ; PCG : postcervical groove ; PS : postsupraorbital spine ; SC : subdorsal carina ; SDS : subdorsal spine ; SS : supraorbital spine.

LIST OF STATIONS. — The list of the stations of MUSORSTOM I, 2, 3, 5 Cruises where Nephropidae have been collected is given here.

Detailed data concerning other collections taken into account in tbis paper are given with the list of material from each species.

In the list, CP = beam trawl ; CC and CH = otter trawl.

MUSORSTOM 1. **Philippines.**

Station 10. — 19.03.1976, 20 h 55, 13°59.8′ N-120°18.2′ E, 187-205 m (CP) : *Metanephrops thomsoni.*

Station 11. — 20.03.1976, 8 h 55, 13°59.8′ N-120°23.7′ E, 217-230 m (CC) : *Metanephrops thomsoni.*

Station 12. — 20.03.1976, 10 h 40, 14°00.8′ N-120°20.5′ E, 187-210 m (CC) : *Metanephrops thomsoni.*

Station 20. — 21.03.1976, 10 h 10, 13°59.2′ N-120°20.3′ E, 208-222 m (CP) : *Metanephrops thomsoni.*

Station 21. — 21.03.1976, 11 h 15, 14°01′ N-120°22.8′ E, 174-223 m (CP) : *Metanephrops thomsoni.*

Station 24. — 22.03.1976, 8 h 00, 14°00′ N-120°18′ E, 189-209 m (CP) : *Metanephrops thomsoni.*

Station 25. — 22.03.1976, 9 h 37, 14°02.7′ N-120°20.3′ E, 191-200 m (CP) : *Metanephrops thomsoni.*

Station 26. — 22.03.1976, 11 h 10, 14°00.9′ N-120°16.8′ E, 189 m (CP) : *Metanephrops thomsoni.*

Station 30. — 22.03.1976, 20 h 25, 14°01.3′ N-120°18.7′ E, 177-186 m (CP) : *Metanephrops thomsoni.*

Station 31. — 22.03.1976, 21 h 55, 14°00′ N-120°16′ E, 187-195 m (CP) : *Metanephrops thomsoni.*

Station 32. — 23.03.1976, 7 h 58, 14°02.2′ N-120°17.7′ E, 184-193 m (CP) : *Metanephrops thomsoni.*

Station 34. — 23.03.1976, 11 h 42, 14°01′ N-120°15.8′ E, 188-191 m (CP) : *Metanephrops thomsoni.*

Station 35. — 23.03.1976, 13 h 37, 13°59′ N-120°18.5′ E, 186-187 m (CP) : *Metanephrops thomsoni.*

Station 40. — 24.03.1976, 8 h 12, 13°57.4′ N-120°27.8′ E, 265-287 m (CP) : *Metanephrops thomsoni.*

Station 42. — 24.03.1976, 11 h 10, 13°55′ N-120°28.6′ E, 379-407 m (CP) : *Metanephrops sinensis.*

Station 43. — 24.03.1976, 14 h 52, 13°50.5′ N-120°28′ E, 448-484 m (CP) : *Metanephrops andamanicus.*

Station 44. — 24.03.1976, 17 h 17, 13°46.9′ N-120°29.5′ E, 592-610 m (CP) : *Metanephrops andamanicus, Nephropsis ensirostris.*

Station 47. — 25.03.1976, 8 h 02, 13°40.7′ N-120°30′ E, 685-757 m (CP) : *Nephropsis stewarti.*

Station 49. — 25.03.1976, 15 h 45, 13°49′ N-119°59.8′ E, 750-925 m (CP) : *Nephropsis acanthura, N. sulcata.*

Station 50. — 25.03.1976, 17 h 50, 13°49.2′ N-120°01.8′ E, 415-510 m (CP) : *Metanephrops andamanicus, Nephropsis stewarti.*

Station 51. — 25.03.1976, 20 h 08, 13°49.4′ N-120°01.8′ E, 170-200 m (CP) : *Metanephrops thomsoni, Nephropsis stewarti.*

Station 54. — 26.03.1976, 9 h 07, 13°54.2′ N-119°57.9′ E, 975-1 075 m (CP) : *Nephropsis acanthura.*

Station 65. — 27.03.1976, 15 h 05, 14°00′ N-120°19.2′ E, 194-202 m (CC) : *Metanephrops thomsoni.*

Station 69. — 27.03.1976, 20 h 08, 13°58.8′ N-120°17.3′ E, 187-199 m (CC) : *Metanephrops thomsoni.*

MUSORSTOM 2. **Philippines.**

Station 1. — 20.11.1980, 11 h 00, 14°00.3′ N-120°19.3′ E, 188-198 m (CP) : *Metanephrops thomsoni.*

Station 2. — 20.11.1980, 13 h 28, 14°01′ N-120°17.1′ E, 184-186 m (CP) : *Metanephrops thomsoni.*

Station 10. — 21.11.1980, 10 h 01, 14°00.1′ N-120°18.5′ E, 188-195 m (CP) : *Metanephrops thomsoni.*

Station 11. — 21.11.1980, 13 h 39, 14°00.4′ N-120°19.7′ E, 194-196 m (CP) : *Metanephrops thomsoni.*

Station 13. — 21.11.1980, 16 h 48, 14°00.5′ N-120°20.7′ E, 193-200 m (CP) : *Metanephrops thomsoni.*

Station 18. — 21.11.1980, 10 h 35, 14°00′ N-120°18.6′ E, 188-195 m (CP) : *Metanephrops thomsoni.*

Station 19. — 22.11.1980, 12 h 21, 14°00.5′ N-120°16.5′ E, 189-192 m (CP) : *Metanephrops thomsoni.*

Station 24. — 23.11.1980, 7 h 33, 13°37.2′ N-120°42.3′ E, 640-647 m (CP) : *Nephropsis ensirostris.*

Station 25. — 23.11.1980, 9 h 00, 13°39′ N-120°42.6′ E, 520-550 m (CP) : *Nephropsis ensirostris.*

Station 26. — 23.11.1980, 12 h 00, 13°49.6′ N-

120°50′ E, 299-320 m (CP) : *Metanephrops sinensis.*

Station 36. — 24.11.1980, 17 h 20, 13°31.4′ N-121°23.9′ E, 569-595 m (CP) : *Metanephrops andamanicus.*

Station 44. — 26.11.1980, 9 h 18, 13°23.2′ N-122°20.7′ E, 760-820 m (CP) : *Nephropsis ensirostris, N. stewarti.*

Station 50. — 27.11.1980, 7 h 25, 13°36.7′ N-120°33.7′ E, 810-820 m (CP) : *Acanthacaris tenuimana, Nephropsis sulcata.*

Station 55. — 27.11.1980, 20 h 32, 13°53.7′ N-119°58.5′ E, 865 m (CP) : *Nephropsis sulcata.*

Station 56. — 28.11.1980, 7 h 40, 13°53.7′ N-119°56.3′ E, 970 m (CP) : *Nephropsis sulcata, N. acanthura.*

Station 63. — 29.11.1980, 9 h 00, 14°07.3′ N-120°15′ E, 215-230 m (CP) : *Metanephrops thomsoni.*

Station 64. — 29.11.1980, 10 h 50, 14°01.5′ N-120°18.9′ E, 191-195 m (CP) : *Metanephrops thomsoni.*

Station 66. — 29.11.1980, 13 h 34, 14°00.6′ N-120°20.3′ E, 192-209 m (CP) : *Metanephrops thomsoni.*

Station 67. — 29.11.1980, 14 h 38, 14°00.1′ N-120°18.5′ E, 193-199 m (CP) : *Metanephrops thomsoni.*

Station 72. — 30.11.1980, 14 h 21, 14°00.7′ N-120°19.4′ E, 182-197 m (CP) : *Metanephrops thomsoni.*

Station 74. — 30.11.1980, 17 h 20, 13°53.2′ N-120°26.2′ E, 300-370 m (CP) : *Metanephrops andamanicus, M. sinensis.*

Station 75. — 01.12.1980, 6 h 30, 13°50.5′ N-120°30.3′ E, 300-330 m (CP) : *Metanephrops andamanicus, M. sinensis, Nephropsis stewarti.*

Station 78. — 01.12.1980, 12 h 10, 13°49.1′ N-120°28′ E, 441-550 m (CP) : *Metanephrops andamanicus.*

Station 82. — 02.12.1980, 6 h 16, 13°46.1′ N-120°28.4′ E, 550 m (CP) : *Nephropsis ensirostris.*

Station 83. — 02.12.1980, 8 h 00, 13°55.2′ N-120°30.5′ E, 318-320 m (CP) : *Metanephrops sinensis.*

MUSORSTOM 3. **Philippines.**

Station 86. — 31.05.1985, 9 h 00, 14°00′ N-120°18′ E, 187-192 m (CP) : *Metanephrops thomsoni.*

Station 87. — 31.05.1985, 10 h 24, 14°00′ N-120°19′ E, 191-197 m (CP) : *Metanephrops thomsoni.*

Station 91. — 31.05.1985, 16 h 00, 14°00′ N-120°18′ E, 190-203 m (CP) : *Metanephrops thomsoni.*

Station 92. — 31.05.1985, 20 h 25, 14°03′ N-120°12′ E, 224 m (CP) : *Metanephrops thomsoni.*

Station 98. — 01.06.1985, 12 h 30, 14°00′ N-120°18′ E, 194-205 m (CP) : *Metanephrops thomsoni.*

Station 99. — 01.06.1985, 13 h 50, 14°01′ N-120°19′ E, 196-204 m (CP) : *Metanephrops thomsoni.*

Station 101. — 01.06.1985, 16 h 35, 14°00′ N-120°19′ E, 194-196 m (CP) : *Metanephrops thomsoni.*

Station 103. — 01.06.1985, 20 h 30, 14°00′ N-120°18′ E, 193-200 m (CP) : *Metanephrops thomsoni.*

Station 105. — 01.06.1985, 23 h 25, 13°52′ N-120°30′ E, 398-417 m (CP) : *Metanephrops andamanicus, Nephropsis stewarti.*

Station 116. — 03.06.1985, 9 h 03, 12°32′ N-120°46′ E, 804-812 m (CP) : *Nephropsis sulcata.*

Station 118. — 03.06.1985, 17 h 15, 11°58′ N-121°06′ E, 448-466 m (CP) : *Metanephrops andamanicus, Nephropsis stewarti.*

Station 119. — 03.06.1985, 19 h 40, 11°59′ N-121°13′ E, 320-337 m (CP) : *Metanephrops sinensis.*

Station 120. — 03.06.1985, 22 h 00, 12°06′ N-121°15′ E, 219-220 m (CP) : *Metanephrops thomsoni.*

Station 122. — 04.06.1985, 6 h 42, 12°20′ N-121°42′ E, 673-675 m (CP) : *Nephropsis stewarti, N. ensirostris.*

Station 123. — 04.06.1985, 9 h 09, 12°10′ N-121°45′ E, 700-702 m (CP) : *Metanephrops andamanicus, Nephropsis stewarti, N. ensirostris.*

Station 125. — 04.06.1985, 14 h 12, 11°58′ N-121°29′ E, 388-404 m (CP) : *Metanephrops sinensis.*

Station 128. — 05.06.1985, 6 h 51, 11°50′ N-121°41′ E, 815-821 m (CP) : *Nephropsis stewarti, N. ensirostris.*

Station 135. — 05.06.1985, 22 h 30, 11°59′ N-122°02′ E, 486-551 m (CP) : *Metanephrops andamanicus, Nephropsis stewarti.*

Station 143. — 07.06.1985, 4 h 15, 11°28′ N-

124°12′ E, 205-214 m (CP) : *Metanephrops thomsoni.*

MUSORSTOM 5. **Chesterfield Islands.**

Station 323. — 14.10.1986, 9 h 35, 21°18.52′ S-157°57.62′ E, 970 m (CP) : *Nephropsis acanthura.*

Station 324. — 14.10.1986, 12 h 20, 21°15.01′ S-157°51.33′ E, 970 m (CP) : *Nephropsis acanthura.*

Station 386. — 22.10.1986, 9 h 15, 20°56.21′ S-160°52.14′ E, 755-770 m (CP) : *Nephropsis sulcata.*

Station 387. — 22.10.1986, 11 h 33, 20°53.41′ S-160°51.14′ E, 650-660 m (CP) : *Nephropsis sulcata.*

SYSTEMATIC ACCOUNT

Genus *ACANTHACARIS* Bate, 1888

Acanthacaris tenuimana Bate, 1888

Acanthacaris tenuimana Bate, 1888, pl. 21. — HOLTHUIS, 1974 : 752 ; 1984 (unnumered pages and figure). — PHILLIPS *et al.*, 1980 : 67. — HAYASHI & OGAWA, 1985 : 220, fig. 1. — BURUKOVSKY & CKREHKO, 1986 : 93, text-fig.

Acanthocaris tenuimana - BATE, 1888, pl. 22 (incorrect original spelling).

Acanthacaris tenuimanus - BRUCE, 1974 : 303, figs. 1, 2.

Acanthacaris opipara Burukovsky & Musij, 1976 : 1811, figs 1, 2. — BURUKOVSKY & CKREHKO, 1986 : 94, text-fig.

Acanthacaris opipera - PHILLIPS *et al.*, 1980 : 67 (erroneous spelling).

Acanthacaris sp. - VON COSEL, 1987 : 20, pl. 3, fig. F (photo in colour).

Phoberus tenuimanus - BATE, 1888 : 171.

Phoberus caecus - ALCOCK, 1899 : 33 ; 1901a : 156 ; 1902 : 127, 168, 264 (not A. Milne-Edwards, 1881).

Phoberus caecus var. *tenuimanus* - ALCOCK & MCARDLE, 1903, pl. 60. — BOUVIER, 1925 : 416.

Phoberus caecus var. *sublevis* Wood-Mason, 1891 : 197. — ALCOCK & ANDERSON, 1894 : 161. — ANDERSON, 1896 : 96.

Neophoberus caecus tenuimanus - FIRTH & PEQUEGNAT, 1971 : 81.

MATERIAL EXAMINED. — **Madagascar.** *Vauban* : CH 108, 22°18.9′ S-43°01.1′ E, 735-760 m, 30.11.1973 : 1 ♂ 128 mm (MNHN-AS 436). — CH 116, 22°13.6′ S-43°02.1′ E, 670-710 m, 02.12.1973 : 1 ♀ ov. 110 mm (MNHN-AS 543). — CH 133, 13°02′ S-48°02′ E, 1 000-1 525 m, 21.01.1975 : 1 ♂ 101 mm (without rostrum) (MNHN-AS 442).

Mascareignes III : CH 102, 22°17′ S-43°02′ E, 790 m, 24.11.1986 : 1 ♂ 153 mm ; 1 ♀ ov. 185 mm (MNHN-AS 439, 441). — CH 105, 22°18.3′ S-43°01.4′ E, 700 m, 25.11.1986 : 1 ♀ ov. 137 mm (MNHN-AS 438). — CH 110, 22°24.2′ S-43°03′ E, 620-640 m, 26.11.1986 : 1 ♂ 212 mm (MNHN-AS 440). — CH 122, 22°16.8′ S-43°02.7′ E, 600 m, 30.11.1986 : 1 ♀ 68 mm (MNHN-AS 437).

Philippines. MUSORSTOM 2 : stn CP 50, 810-820 m : 1 juv. 18 mm (MNHN-AS 444).

New Caledonia. BIOCAL : stn CP 57, 23°44′ S-166°58′ E, 1 490-1 620 m, 01.09.1985 : 1 juv. 18 mm (MNHN-AS 443).

Indonesia. *Challenger* : stn 191, 05°41′ S-134°04′30″ E, 1 480 m, 23.09.1874 : 1 ♀, holotype, 97 mm (BMNH).

Acanthacaris tenuimana was described by BATE from one female caught off Indonesia. Subsequently the species has been cited from the Arabian and Laccadive seas (WOOD-MASON, 1891 ; ALCOCK & ANDERSON, 1894 ; ALCOCK, 1899, 1901 ; ANDERSON, 1896) either under the name of the other species in the genus, *A. caeca* (A. Milne-Edwards, 1881), or as a variety (*sublevis*) of the species described by BATE. Recently, BRUCE (1974), HOLTHUIS (1974), and HAYASHI and OGAWA (1985) reported the species from the

China Sea, Indonesia, and Sea of Japan, respectively.

Comparison of the material of *A. tenuimana* with several specimens of *A. caeca* (Atlantic Ocean : 1 ♀ 93 mm, RMNH 22555 — 1 ♂ 124 mm, RMNH 22523 — 1 ♂ 111 mm, RMNH 15463 — 1 ♂ 126 mm, RMNH 23436 — 1 ♂ 159 mm BMNH 1939.4.24.1) showed the two species to be readily distinguishable because of the shape of the first pereiopods. In *A. caeca* the hand is slightly shorter than the fingers, as HOLTHUIS (1974) pointed out. This ratio stays quite constant (0.8-0.9) over the entire size range of *A. caeca*. In contrast, the ratio is quite variable in *A. tenuimana*; it was 0.8 in the smallest specimens examined (CL = 18 mm), 0.66 in the holotype (97 mm), and 0.5 or less in specimens larger than 140 mm.

The differences suggested by several authors (HOLTHUIS, 1974 ; HAYASHI & OGAWA, 1985), e.g., the shape of the pleura of the abdominal segments, the shape and spinulation of the telson, and the number of spines on the rostrum, present a certain variability in the specimens examined. They should therefore be used with caution.

The number of spines on the rostrum in *A. tenuimana* is variable and unrelated to individual size or sex. The dorsal border bears 0-4 spines, the ventral margin 4-6 spines.

BURUKOVSKY and MUSIJ (1976) described a new species (*A. opipara*) from a female caught off Madagascar. The character used to differentiate *A. opipara* from the other species of the genus (finger length = twice palm length) is not valid in view of the variability observed in this character. Therefore, as HOLTHUIS (1984) pointed out, this name should be considered a junior synonym of *A. tenuimana* Bate.

SIZE. — The females examined ranged from 97 to 185 mm in length ; the males from 128 to 212 mm. The two juveniles measured 18 mm.

DISTRIBUTION. — Japan, China Sea, Philippines, Indonesia, New Caledonia, Arabian and Laccadive Seas, Madagascar. Muddy bottoms between 600 and 1 620 m in depth.

Genus *METANEPHROPS* Jenkins, 1972

Metanephrops andamanicus (Wood-Mason, 1892)

Figs 2 c-d, 3 c-d

Nephrops andamanicus Wood-Mason, 1892 : pl. 4. — ALCOCK, 1894a : pl. 8, fig. 5 ; 1894b : 226. — ORTMANN, 1897 : 273. — DE MAN, 1916 : 99, pl. 3, fig. 15. — BALSS, 1925 : 207. - DRAGOVICH, 1969 : 19. — JENKINS, 1972 : 162. — BURUKOVSKY, 1974 : 111 (key) (ed. 1983 : 157). — SAKAI, 1978 : 9, fig. 4.

Nephrops Andamanicus - CHUN, 1900 : 364, 500, fig. 368 ; 1903 : 535.

Nephrops andamanica - ALCOCK, 1901b : 66. — LONGHURST, 1970 : 286.

Nephrops thomsoni var. *andamanica* - ALCOCK, 1901a : 153 ; 1902 : 147, 148, 260.

Metanephrops andamanicus - JENKINS, 1972 : 171. — GEORGE, 1983 : figs 19, 20. — CHAN & YU, 1987 : 184 (key).

not *Nephrops andamanicus* - GILCHRIST, 1921 : 4 ; 1922 : 7 ; 1925 : 24. — CALMAN, 1925 : 22. — BARNARD, 1927 : 127. — BERRY, 1969 : 5, fig. 1. — CROSNIER & JOUANNIC, 1973 : 13 (= *Metanephrops mozambicus* sp. nov.).

not *Nephrops andamanica* - BARNARD, 1950 : 528, fig. 99 a. — SANKARANKUTTY & SUBRAMANIAN, 1976 : 20, pl. 2. — KENSLEY, 1981 : 29 (= *Metanephrops mozambicus* sp. nov.).

not *Metanephrops andamanicus* - WEAR, 1976 : 119, fig. 3f, g. — IVANOV & KUYLOV, 1980 : 288. — ANONYMOUS, 1981 : 3. — HOLTHUIS, 1984 : (unnumbered pages and figures). — VON COSEL, 1987 : 13 (= *Metanephrops mozambicus* sp. nov.).

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 1 : stn 43, 448-484 m : 1 ♀ 28 mm (MNHN-AS 454). — Stn 44, 529-610 m : 1 ♀ 20 mm (MNHN-AS 451). — Stn 50, 415-510 m : 1 ♀ 29 mm (MNHN-AS 455).

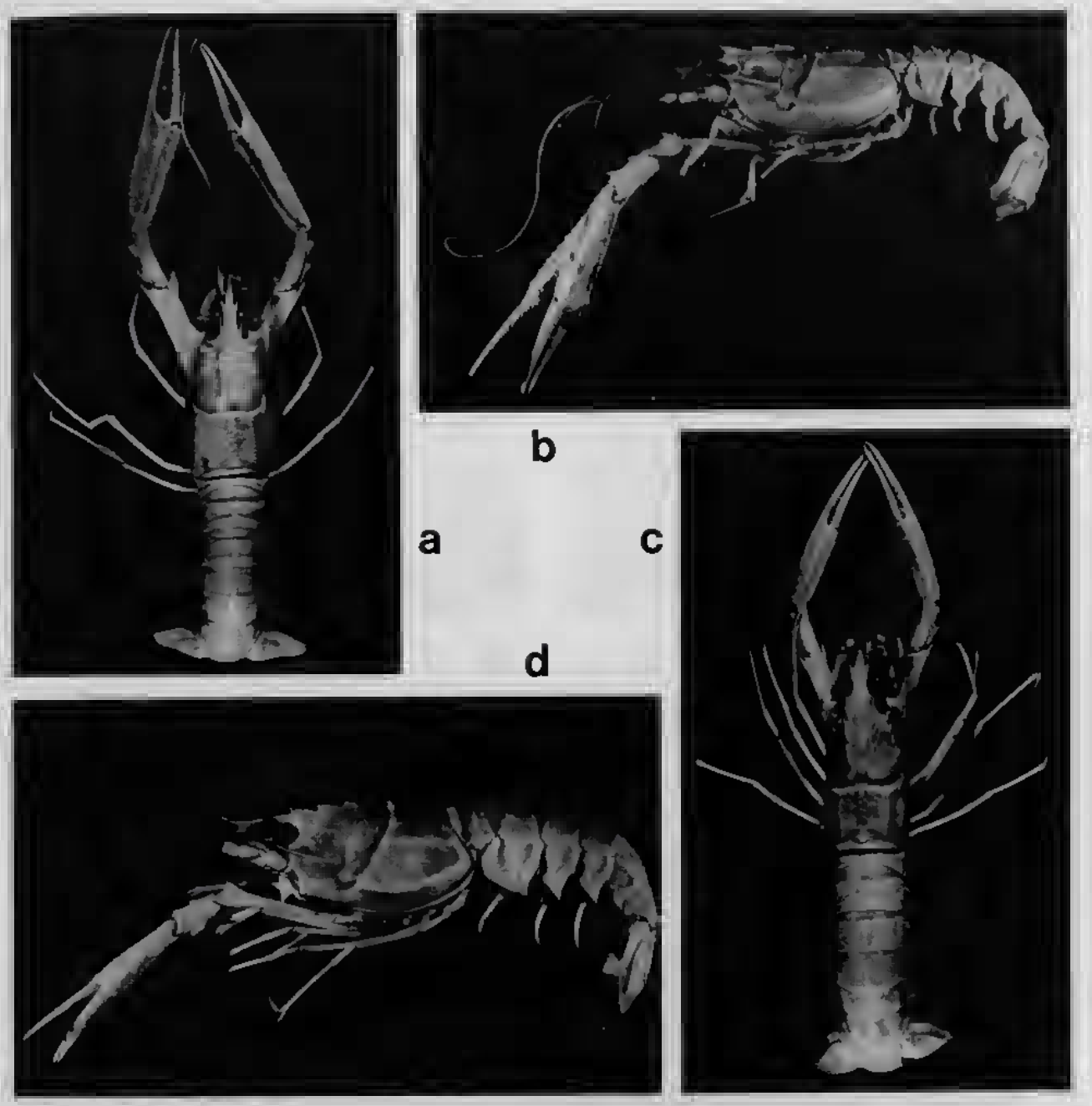

FIG. 2a-b. — *Metanephrops mozambicus* sp. nov., holotype ♂ 88 mm, *Vauban*, Madagascar, CH 56, 395-410 m (MNHN-AS 457) : General appearance, a, dorsal view ; b, lateral view.

FIG. 2c-d. — *Metanephrops andamanicus* (Wood-Mason), ♀ 69 mm, MUSORSTOM 3, Philippines, Stn 123, 700-702 m (MNHN-AS 452) : General appearance, c, dorsal view ; d, lateral view.

MUSORSTOM 2 : stn CP 36, 569-595 m : 1 ♀ 36 mm (MNHN-AS 456). — Stn CP 74, 300-370 m : 1 ♀ 45 mm (MNHN-AS 450). — Stn CP 75, 300-330 m : 4 ♂ 59 to 77 mm ; 5 ♀ 38 to 74 mm ; 1♀ ov. 73 mm (MNHN-AS 447). — Stn CP 78, 441-550 m : 1 ♀ 31 mm (MNHN-AS 453).

MUSORSTOM 3 : stn CP 105, 398-417 m : 1 ♀ ov. 67 mm (MNHN-AS 445). — Stn CP 118, 448-466 m : 5 ♂ 31-86 mm ; 3 ♀ 31-68 mm (MNHN-AS 448, 449). — Stn CP 123, 700-702 m : 1 ♀ 69 mm (MNHN-AS 452). — Stn CP 135, 486-551 m : 1 ♀ 46 mm ; 1 ♀ ov. 82 mm (MNHN-AS 446).

Andaman Sea : 342-749 m : 1 ♀ 74 mm (BMNH). — 11°31'40" N-92°46'50" E, 348-370 m : 1 ♂ 64 mm (BMNH) (Indian Museum exchange).

REMARKS. — The specimens collected in the Philippine Islands are similar to those from the Andaman Sea and agree with the description and figures provided by WOOD-MASON and ALCOCK. However, the cervical spine (sensu HOLTHUIS, 1974) is more developed in the specimens from the Indian Ocean. In the specimens from the Philippines this spine is clearly smaller and in several specimens is reduced to a granule.

The species has been recorded from the Andaman Sea, Indonesia and the Philippines, at depths of from 289 to 749 m.

Metanephrops mozambicus sp. nov.

Figs 2 a-b, 3 a-b

Nephrops andamanicus - GILCHRIST, 1921 : 4 ; 1922 : 7 ; 1925, 24. — CALMAN, 1925 : 22. — BARNARD, 1927 : 127. — BERRY, 1969 : 5, fig. 1. — CROSNIER & JOUANNIC, 1973 : 13 (not Wood-Mason, 1892).

Nephrops andamanica - BARNARD, 1950 : 528, fig. 99a. — SANKARANKUTTY & SUBRAMANIAN 1976 : 20, pl. 2. — KENSLEY, 1981 : 29 (not Wood-Mason, 1892).

Metanephrops andamanicus - WEAR, 1976 : 119, fig. 3f, g. — IVANOV & KUYLOV, 1980 : 288. — ANONYMOUS, 1981 : 3. — HOLTHUIS, 1984 (unnumbered pages and figures). — VON COSEL, 1987 : 13 (not Wood-Mason, 1892).

MATERIAL EXAMINED. — **Madagascar**. *Vauban* : CH 19, 12°38.0' S-48°15.5' E, 393-403 m, 18.01.1972 : 1 ♀ ov. 77 mm (MNHN-AS 463). — CH 25, 12°26.2' S-48°13.0' E, 600-605 m, 19.01. 1972 : 3 ♂ 55 to 68 mm ; 2 ♀ 43 and 49 mm (MNHN-AS 462). — CH 33, 12°28.1' S-48°12.2' E, 600-605 m, 13.09.1972 : 1 ♂ 45 mm (MNHN-AS 467). — CH 45, 15°20.5' S-46°9.0' E, 310-350 m, 07.11.1972 : 1 ♂ 65 mm (MNHN-AS 461). — CH 48, 15°18.0' S-46°12.1' E, 480-510 m, 08.11. 1972 : 2 ♂ 53 and 63 mm ; 3 ♀ 42 to 58 mm (MNHN-AS 469). — CH 56, 23°36.0' S-43°31.6' E, 395-410 m, 26.02.1973 : 2 ♂ 73 and 88 mm ; 1 ♀ ov. 83 mm (MNHN-AS 457, 458, 459).

Macareignes III : CH 4, 22°25.8' S-43°05.8' E, 400-410 m, 20.12.1985 : 1 ♀ 37 mm (MNHN-AS 349). — CH 6, 22°27.5' S-43°06.2' E, 425-450 m, 21.12.1985 : 1 ♀ 35 mm (MNHN-AS 355). — CH 33, 22°23.4' S-43°04' E, 450-500 m, 20.01. 1986 : 2 ♂ 73 and 82 mm ; 1 ♀ ov. 77 mm (MNHN-AS 354). — CH 61, 22°25.8' S-43°05' E, 550 m, 19.10.1986 : 1 ♀ 61 mm (MNHN-AS 464). — CH 65, 22°26.1' S-43°4.6' E, 520 m, 20.10.1986 : 2 ♂ 59 and 59 mm (MNHN-AS 460, 464). — CH 78, 22°20.5' S-43°3.1' E, 530 m, 24.10.1986 : 1 ♀ 57 mm (MNHN-AS 466).

North of Tulear : 1 ♂ 78 mm ; 1 ♀ ov. 81 mm (MNHN-AS 353).

Mozambique. Summer 1965 : 1 ♂ 85 mm ; 2 ♀ ov. 72 and 75 mm (MNHN-AS 56).

South Africa. *Africana* : stn T02, 29°46.6' S-31°23' E, 290 m, 24.08.1986 : 1 ♂ 78 mm (ICM 1035).

TYPES. — One male from Madagascar (*Vauban*, CH 56) with a carapace length of 88 mm (MNHN-AS 457) has been selected as the holotype. The ovigerous female from the same station with a carapace length of 83 mm (MNHN-AS 458) is the allotype. The remaining specimens are the paratypes.

DESCRIPTION — Carapace smooth, pubescent. Except for the furrows, abdomen almost entirely without pubescence.

Rostrum reaching distinctly beyond the end of tbe antennular peduncle, being slightly longer than the distance between the orbit and the postcervical groove. Proximally curved downwards and upwards after it passes the end of the scaphocerite. Lateral carina well-developed, extending from the apex of the rostrum and continuing along the ventro-posterior orbital margin. Lower margin with one tooth near the level of the apex of the scapbocerite. Two dorsal rostral carinae diverging behind tbe end of the rostrum, bearing a pair of teeth over the orbit, pointing anterodorsally and slightly outwards. Three pairs of postrostral teeth behind the orbit directed anterodorsally, but not outwards. Surface between the two dorsal rostral carinae concave, with a furrow between the pre- and postorbital pairs of teeth.

A well-developped dorsal cardiac ridge behind the postcervical groove, with a pair of forwardly directed spines anteriorly. Two rows of spinules along the cardiac ridge between the postcervical

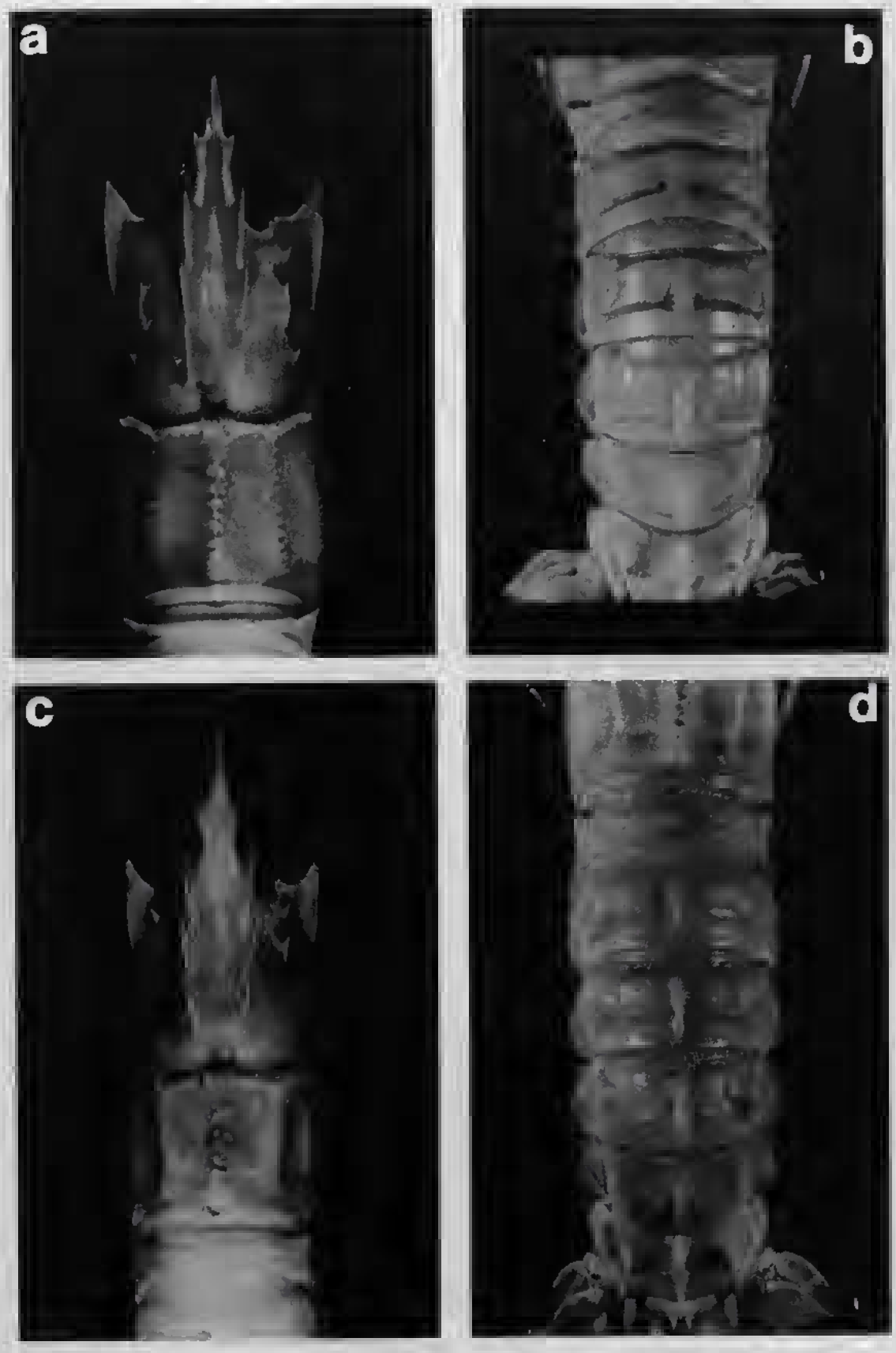

FIG. 3a-b. — *Metanephrops mozambicus* sp. nov., holotype ♂ 88 mm, *Vauban*, Madagascar, CH 56, 395-410 m (MNHN-AS 457) : a, carapace, dorsal view ; b, abdomen, dorsal view.

FIG. 3c-d. — *Metanephrops andamanicus* (Wood-Mason), ♀ 68 mm, MUSORSTOM 3, Philippines, Stn 123, 700-702 m (MNHN-AS 452) : c, carapace, dorsal view ; d, abdomen, dorsal view.

groove and the posterior margin, without a furrow between the rows.

Antennal spine large with outer margin convex, directed anteriorly and dorsally, nearly reaching the end of the eyes. Three small postorbital spines between the postrostral tooth and the antennal spines, the largest at the level of the second postrostral spine.

Cervical groove distinct, starting below the antennal spine and curving upwards just before the hepatic spine. Postcervical groove pubescent, very distinct. Upper part closer to the posterior border of the carapace than to the postorbital margin. Lower portion curving anteriorly below the hepatic spine and then upwards, merging with the cervical groove. Lateral surface of the carapace bearing three conspicuous lateral ridges behind the postcervical groove. Upper ridge granulate, situated slightly upper end of the cervical groove, the anterior portion terminating in a small spine. Middle ridge thicker than the other two ridges, located at a level between the postorbital and antennal spines, also terminating in a small spine ; no conspicuous granules along the ridge. Lowest ridge smooth, convex ventrally, reaching the postcervical groove behind the hepatic spine, and ending in a small spine similar in size to those of the other two ridges.

Lateral and posterior margins broadened.

Antennal peduncle slightly overreaching the antennular peduncle.

Scaphocerite laminar, outer margin slightly convex. Anterior and inner margins rounded, with long setae. A minute tooth on the anterior end of the outer margin.

Eyes large and subspherical, diameter approximately equal to scaphocerite length.

Third maxilliped overreaching the end of the scaphocerite by the length of the dactylus.

First pereiopods subequal, the left chela being slightly longer than the right. Ischium smooth. Merus rather triangular, dorsal border bearing minute granules. Inner and dorsal margins terminating anteriorly in a strong spine, outer margin ending in a rounded point. Carpus subcylindrical, about one-half merus length, covered with small granules, and bearing a small spine medially on the outer surface, one large spine on the anterior end of the outer margin, and another on the anterior edge of the dorsal border. Palms of chelae bearing five longitudinal granulate or denticulate ridges, without spines. Fingers dorsoventrally flattened, ending at the same level, with minute granules, each tip terminating in a sharp, inwardly curving tooth. Cutting edges with a single row of denticles, those on the movable finger smaller. One well-developed tooth on the proximal half of the fixed finger. Basal portion of the cutting edge of the movable finger fringed with setae. Fixed finger with setae on the proximal two-thirds of the cutting edge. Sometimes a medial brush of setae along the proximal half of the free finger ventrally.

Other pereiopods smooth and subcylindrical. Second pereiopod overreaching the apex of the rostrum by about the length of the fingers. Third pereiopod slightly overreaching the second. Fourth pereiopod overreaching the second by the length of the dactylus. Fifth pereiopod barely surpassing the end of the scaphocerite. Chelae of second and third pereiopods, dactylus of fourth, and subchela of fifth with rows of setae.

Terga of abdominal segments with smooth articular surfaces and lacking a carina on the median line. Non-articular surfaces smooth, with transverse, pubescent grooves. Non-articular surface of first somite with a small, short, transverse groove laterally. Second and third somites with a well-developed groove extending medially from near the hinge with the posterior segment almost to the midline ; the grooves on the fourth and fifth segments extending a shorter distance laterally. Sixth segment without grooves. Distinction between tergum and pleura well-marked on the 2nd to 5th segments. Lower borders of terga forming a ridge extending from hinge to hinge. Pleura of second segment broad and acutely pointed posteriorly. Third to fifth pleurae acute but less broad, decreasing in size posteriorly. Sixth tergite bearing a triangular elevation armed with a spine on each anterolateral portion. Central region of sixth segment with a medial spine on the posterior margin. A spine on the posterolateral angle of the tergite.

Telson subrectangular. Lateral and posterior margins slightly concave. Posterolateral angles with well-developed single spines. Dorsal surface with two acute spines on the proximal quarter. Centre of dorsum occupied by a triangular depression with the apex directed anteriorly.

Basal segment of uropod bearing a spine. Lateral border of exopodite and endopodite ending in an acute spine. Posterior margin of caudal fan fringed with long setae.

First pleopod strong, subcylindrical, curved anteriorly and ventrally, and produced into an acute process. Other pleopods well-developed and biramose.

REMARKS. — *Metanephrops mozambicus* belongs to the "*japonicus*" group of the genus (JENKINS, 1972; CHAN & YU, 1987), characterized in that the carapace is smooth between the ridges, except for several large spines. The chela of the first pereiopod is heavily ridged and spinulose, and the surface of the abdominal tergites is conspicuously sculptured.

Among the species of the group (*M. formosanus, M. japonicus, M. sagamiensis*, and *M. andamanicus*), the closest is *M. andamanicus* (Wood-Mason, 1892), with which it has often been confused. However, examination of numerous specimens of *M. andamanicus* (see above) has shown these two species to be clearly differentiated by :

(a) Abdominal segments densely covered with short hairs in *M. andamanicus*, this pubescence practically absent in the new species. Carapace also more pubescent in *M. andamanicus*.

(b) 2nd to 5th abdominal segments clearly carinate along the median line and sculptured in *M. andamanicus*; midline clearly smooth and segments less sculptured in *M. mozambicus*.

(c) Dorsal surface of rostrum between lateral rostral carinae at the level between the two pairs of rostral spines bearing a distinct groove in the new species; rostrum in *M. andamanicus* more compressed without a groove between rostral carinae.

(d) Rostrum more downwardly directed in *M. andamanicus* than in the new species.

(e) Rostral and postrostral teeth more outwardly directed in *M. andamanicus* than in *M. mozambicus*.

(f) Spines on the carapace more acute and developed in the new species than in *M. andamanicus*.

(g) Carinae behind postcervical groove spinier in the new species.

SIZE. — The males examined ranged between 45 and 88 mm (carapace length). The females ranged from 37 to 83 mm. BERRY (1969) reported the onset of sexual maturity to take place at around 47 mm (carapace length excluding the rostrum) in females. The length of the longest specimens (total length, rostrum-telson) caught in the Mozambique Channel was 205 mm (male) and 200 mm (female).

COLOUR. — Carapace and abdomen pinkish. Chelae banded with pink.

DISTRIBUTION. — This species is distributed along the continental shelf and slope from Natal to Kenya on muddy bottoms at depths between 200 and 750 m. Nevertheless, maximum concentrations are located between 400 and 500 m (BERRY, 1969; CROSNIER & JOUANNIC, 1973; HOLTHUIS, 1984; VON COSEL, 1987). Females carry from 600 to 1 400 eggs. Hatching of eggs has been recorded from March until July, with a peak in May (BERRY, 1969). VON COSEL (1987) found the major share of ovigerous females between 350-450 m during December-January, with the proportion of males and non-ovigerous females increasing in deeper waters.

Metanephrops neptunus (Bruce, 1965)

Nephrops neptunus Bruce, 1965 : 274, pls 13-15 ; 1966b : 256. — JENKINS, 1972 : 163. — BURUKOVSKY, 1974 : 110 (key) (ed. 1983 : 155).
Metanephrops neptunus - JENKINS, 1972 : 171. — PHILLIPS *et al.*, 1980 : 65. — GEORGE, 1983 : 19. — CHAN & YU, 1987 : 184 (key).

MATERIAL EXAMINED. **Indonesia (Makassar).** CORINDON II : stn. 214, 0°31.4′ N-117°50.1′ E, 595 m, 01.11.1980 : 1 ♀ ov. 119 mm (MNHN-AS 257).

REMARKS. — The specimen from the Makassar Strait agrees with the original description and figures. This species is readily distinguished from the other species of the genus due to the armature of the carapace, the region between the postrostral carinae being heavily spinulose.

The specimens described by BRUCE were caught in the South China Sea at 740-805 m. This new occurrence off Indonesia extends its distribution range southwards.

Metanephrops sinensis (Bruce, 1966)

Nephrops sinensis Bruce, 1966a : 155, pls 10-12 ; 1966b : 284. — KABATA, 1966 : 10. — JENKINS,

1972 : 163. — BURUKOVSKY, 1974 : 111 (key) (ed. 1983 : 158).

Metanephrops sinensis - JENKINS, 1972 : 171. — PHILLIPS *et al.*, 1980 : 65. — CHAN & YU, 1987 : 184 (key).

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 1 : stn 42, 379-407 m : 1 ♂ 32 mm ; 1 ♀ 26 mm (MNHN-AS 375).

MUSORSTOM 2 : stn CP 26, 299-320 m : 6 ♂ 47 to 66 mm ; 2 ♀ 39 to 55 mm (MNHN-AS 374). — Stn CP 74, 300-370 m : 1 ♂ 52 mm (MNHN-AS 371). — Stn CP 75, 300-330 m : 1 ♂ 63 mm ; 1 ♀ 53 mm (MNHN-AS 373). — Stn CP 83, 318-320 m : 1♀ 48 mm ; 1 ♀ ov. 67 mm (MNHN-AS 369).

MUSORSTOM 3 : stn CP 119, 320-337 m : 12 ♂ 43 to 68 mm ; 6 ♀ 43 to 66 mm ; 5 ♀ ov. 47 to 50 mm (MNHN-AS 372). — Stn CP 125, 388-404 m : 9 ♂ 32 to 63 mm ; 6 ♀ 26 to 61 mm (MNHN-AS 370).

REMARKS. — BRUCE (1966a) gave a clear and complete description of the species. *M. sinensis* is closely related to *M. thomsoni* (Bate) from the Western Pacific (see below) in view of the transverse furrows present on the 2nd to 5th abdominal tergites and the weakly ridged and finely granulate chelae of the first pereiopods. The transverse furrow on the first abdominal tergite, absent in *M. thomsoni*, is difficult to discern in juveniles. The other specific characters are constant in all the specimens examined.

This species has so far been found only on the edge of the continental shelf south of the Gulf of Tonkin (203-396 m). The specimens from the Philippines were collected at depths between 299 and 407 m.

Metanephrops thomsoni (Bate, 1888)

Nephrops thomsoni Bate, 1888 : 185 (in part, only male), pl. 25, fig. 1, pl. 26. — STEBBING, 1893 : 202. — HUTTON, 1904 : 253. — ESTAMPADOR, 1937 : 497 ; 1959 : 43. — YOSHIDA, 1941 : 34, pl. 10, fig. 2. — LIU & HSU, 1963 : 309. — KUBO, 1965 : 629, fig. 1030. — CHANG, 1965 : 48, unnumbered figure. — BRUCE, 1966a : 164 ; 1966b, 284 ; 1966c : 535. — JENKINS, 1972 : 162. — KIM & PARK, 1972 : 210. — BURUKOVSKY, 1974 : 111 (key) (ed. 1983 : 156). — MIYAKE, 1975 : 106, unnumbered figure. — KIM, 1977 : 346, figs 155, 156, pls 38, 77. — MOTOH *et al.*, 1978 : 22. — SAKAI, 1978 : 8, fig. 3.

Nephrops thomsoni - DE MAN, 1916 : 96, 99.

Nephrops tomsoni - ALCOCK, 1902 : 147.

Nephropsis thomsoni - ANONYMOUS, 1954 : 756, fig. 2178. — TUNG *et al.*, 1958 : 166.

Metanephrops thomsoni - JENKINS, 1972 : 171. — UCHIDA & DOTSU, 1973 : 23, figs 1-7. — PHILLIPS *et al.*, 1980 : 65. — MIYAKE, 1982 : 77, pl. 26, fig. 2. — BABA, 1986 : 151, 280, fig. 102. — CHAN & YU, 1987 : 184 (key).

not *Nephrops thomsoni* - BATE, 1888 : 185 (in part, only female), pl. 25, fig. 2 [= *M. challengeri* (Balss, 1914)].

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 1 : stn 10, 187-205 m : 1 ♂ 24 mm ; 2 ♀ 55 and 63 mm (MNHN-AS 399, 420). — Stn 11, 217-230 m : 9 ♂ 36 to 64 mm ; 11 ♀ 34 to 63 mm (MNHN-AS 384, 391, 393). — Stn 12, 187-210 m : 3 ♂ 57 to 68 mm ; 1 ♀ 40 mm (MNHN-AS 383). — Stn 20, 208-222 m : 1 ♂ 58 mm ; 3 ♀ 44 to 68 mm ; 1 ♀ ov. 56 mm (MNHN-AS 397). — Stn 21, 174-223 m : 2 ♀ 68 and 70 mm (MNHN-AS 395). — Stn 24, 189-209 m : 1 ♀ 33 mm (MNHN-AS 417). — Stn 25, 191-200 m : 1 ♂ 66 mm (MNHN-AS 388). — Stn 26, 189 m : 1 juv. 13 mm (MNHN-AS 421). — Stn 30, 177-186 m : 2 ♀ 26 and 33 mm (MNHN-AS 413). — Stn 31, 187-195 m : 1 juv. 14 mm ; 1 ♀ 32 mm (MNHN-AS 415). — Stn 32, 184-193 m : 2 ♂ 39 and 69 mm (MNHN-AS 402). — Stn 34, 188-191 m : 1 ♂ 33 mm (MNHN-AS 416). — Stn 35, 186-187 m : 1 ♀ 35 mm (MNHN-AS 418). — Stn 40, 265-287 m : 1 ♀ 30 mm (MNHN-AS 419). — Stn 69, 187-199 m : 1 ♀ 34 mm (MNHN-AS 414). — Stn 51, 170-200 m : 1 ♂ 66 mm ; 2 ♀ 56 and 62 mm (MNHN-AS 403). — Stn 65, 194-202 m : 1 ♂ 56 mm (MNHN-AS 392).

MUSORSTOM 2 : stn CP 1, 188-198 m : 1 ♂ 44 mm (MNHN-AS 406). — Stn CP 2, 184-186 m : 1 ♀ ov. 67 mm (MNHN-AS 422). — Stn CP 10, 188-195 m : 1 ♂ 58 mm ; 1 ♀ 46 mm ; 3 ♀ ov. 57 to 62 mm (MNHN-AS 404). — Stn CP 11, 194-196 m ; 4 ♂ 47 to 62 mm ; 1 ♀ ov. 53 mm (MNHN-AS 401). — Stn CP 13, 193-200 m : 1 ♀ ov. 67 mm (MNHN-AS 389). — Stn CP 18, 188-195 m : 5 ♂ 45 to 68 mm ; 1 ♀ ov. 63 mm (MNHN-AS 396). — Stn CP 19, 189-192 m : 1 ♀ 72 mm (MNHN-AS 424). — Stn CP 63, 215-230 m : 1 ♂ 62 mm (MNHN-AS 423). — Stn CP 64, 191-195 m : 2 ♂ 50 and 62 mm (MNHN-AS 382). — Stn CP 66, 192-209 m : 3 ♂ 37

to 56 mm ; 2 ♀ ov. 55 and 65 mm (MNHN-AS 380, 381). — Stn CP 67, 193-199 m : 1 ♀ 13 mm (MNHN-AS 408). — Stn CP 72, 182-197 m : 1 ♀ 43 mm (MNHN-AS 405).

MUSORSTOM 3 : stn CP 86, 187-192 m : 1 ♀ ov. 70 mm (MNHN-AS 385). — Stn CP 87, 191-197 m : 3 ♂ 36 to 63 mm ; 3 ♀ 55-72 mm ; 1 ♀ ov. 57 mm (MNHN-AS 400). — Stn CP 91, 190-203 m : 1 juv. 13 mm ; 1 ♂ 36 mm ; 1 ♀ ov. 57 mm (MNHN-AS 378, 409). — Stn CP 92, 224 m : 1 ♂ 62 mm ; 2 ♀ ov. 67 and 73 mm (MNHN-AS 386). — Stn CP 98, 194-205 m : 2 ♂ 56 and 59 mm (MNHN-AS 387). — Stn CP 99, 196-204 m : 1 juv. 13 mm ; 1 ♂ 54 mm ; 4 ♀ ov. 56 to 61 mm (MNHN-AS 390, 412). — Stn CP 101, 194-196 m : 1 ♂ (broken) ; 1 ♂ 54 mm (MNHN-AS 407, 379). — Stn CP 103, 193-200 m : 2 juv. 14 and 15 mm ; 3 ♂ 64 to 69 mm ; 2 ♀ 40 and 66 mm ; 3 ♀ ov. 59 to 70 mm (MNHN-AS 377, 411). — Stn CP 120, 219-220 m : 1 juv. 18 mm ; 4 ♂ 49 to 59 mm ; 3 ♀ ov. 57 to 65 mm (MNHN-AS 376, 410). — Stn CP 143, 205-214 m : 1 ♂ 60 mm (MNHN-AS 394).

Taiwan : 1 ♂ 37 mm ; 1 ♀ 55 mm (MNHN-AS 344) (D.-A. LEE leg.).

REMARKS. — The characters are constant in the specimens examined and agree quite well with the description and illustrations given by the different authors.

This species has been recorded from the Philippines and Taiwan, the China Sea to Japan, and the Tasman Sea. Depths between 50 and 509 m.

Genus *NEPHROPSIS* Wood-Mason, 1873

The genus comprises thirteen species, five of which are found in the Atlantic Ocean : *N. agassizii* A. Milne Edwards, 1880 ; *N. aculeata* Smith, 1881 ; *N. atlantica* Norman, 1882 ; *N. rosea* Bate, 1888 ; and *N. neglecta* Holthuis, 1974. Eight more species are indigenous to the Pacific and Indian oceans : *N. stewarti* Wood-Mason, 1872 ; *N. carpenteri* Wood-Mason, 1885 ; *N. suhmi* Bate, 1888 ; *N. occidentalis* Faxon, 1893 ; *N. ensirostris* Alcock, 1901 ; *N. malhaensis* Borradaile, 1901 ; *N. acanthura* sp. nov. ; and *N. sulcata* sp. nov.

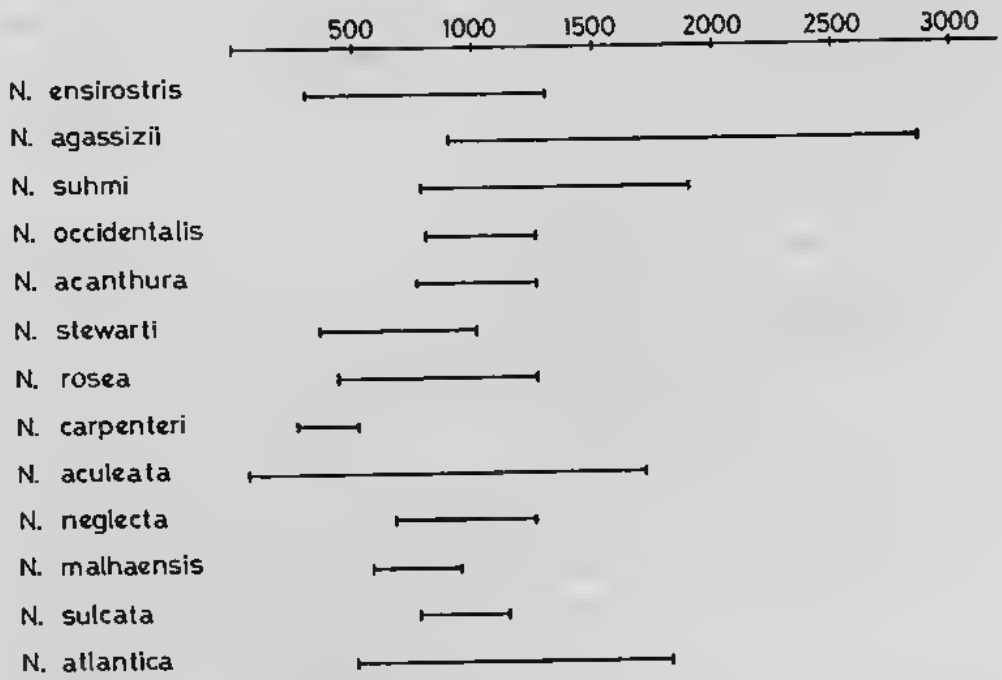

FIG. 4. — Depth distribution of the species of the genus *Nephropsis* depth in meters).

The species of the genus *Nephropsis* normally dwell on muddy bottoms, generally at depths greater than 400 m, although the depth range is quite broad (Figure 4). The species inhabiting the shallowest depths is *N. aculeata*, reported to occur in waters shallower than 100 m (HOLTHUIS, 1974), and *N. agassizii* is the species dwelling at the greatest depths (2 867 m). In the Indian and Pacific oceans *N. carpenteri* dwells in the shallowest waters (250-503 m), *N. suhmi* in the deepest (786-1 900 m).

HOLTHUIS (1974) published a complete description of the genus and a comprehensive revision of Atlantic species, calling attention to a large number of new specific characters. This paper presents a review of the rest of the species of tbe genus reported in the Indian and Pacific oceans, in order to complete the revision of the genus.

Key to the species of the genus *Nephropsis*

1. Rostrum without lateral spines ..... *N. ensirostris*
— Rostrum with lateral spines 2
2. Exopod of uropod with a diaeresis 3
— Exopod of uropod witbout a diaeresis 4
3. Dactylus of fifth pereiopod less than one-balf propodus length ; in adult specimens the distance between the orbital border and tbe postcervical groove around twice the distance between tbe postcervical groove and the posterior border of tbe carapace ..... *N. agassizii*
— Dactylus of fifth pereiopod more than one-balf propodus lengtb ; in adult specimens the distance between the orbital border and the postcervical groove is 1.5 times the distance between the postcervical groove and the posterior border of tbe carapace ..... *N. suhmi*
4. Dorsal surface of telson with a well-developed spine..... 5
— Dorsal surface of telson without spines..... 6
5. Anterior border of second abdominal pleura clearly convex, ending in a short, acute point; no postsupraorbital spine..... *N. occidentalis*
— Anterior border of second abdominal pleura slightly convex, ending in a long, acute point; postsupraorbital spine sometimes present..... *N. acanthura*
6. Rostrum with one pair of lateral spines 7
— Rostrum with two pairs of lateral spines 10
7. Abdomen witbout a median carina ..... *N. stewarti*
— Abdomen with a median carina 8
8. Distance between the supraorbital spine and the gastric tubercle around two-thirds the distance between the gastric tubercle and tbe postcervical groove; a postsupraorbital spine behind tbe supraorbital spine.... *N. rosea*
— Distance between the supraorbital spine and the gastric tubercle equal to or less tban one-half the distance between the gastric tubercle and the postcervical groove; no spine behind the supraorbital spine 9
9. Carpus of second pereiopod sborter than the palm ; length of rostrum one-third the rest of carapace (not including rostrum itself) ..... *N. carpenteri*
— Carpus of second pereiopod longer than tbe palm ; length of rostrum slightly less than one-half the rest of carapace ..... *N. aculeata*

10. Anterior margin of abdominal pleura without spines..... *N. neglecta*
— Anterior margin of at least the second abdominal pleuron with a strong spine 11
11. Abdomen without a median carina ..... *N. malhaensis*
— Abdomen with a median carina 12
12. Rostrum with a median groove clearly overreaching the anterior pair of lateral spines; distance between the supraorbital spine and the gastric tubercle one-half the distance between the gastric tubercle and the postcervical groove..... *N. sulcata*
— Rostrum with a median groove that does not overreach the anterior pair of lateral spines; distance between the supraorbital spine and the gastric tubercle around two-thirds the distance between the gastric tubercle and the postcervical groove..... *N. atlantica*

Nephropsis ensirostris Alcock, 1901

Figs 5 a, 6, 8 a-b, 16 a

Nephropsis ensirostris Alcock, 1901a : 158 (key), 162, pl. 1, fig. 2. — Alcock & McArdle, 1902 : pl. 58, figs 1, 1 a. — Lloyd, 1907 : 4. — de Man, 1916 : 97, 112 (key). — Bouvier, 1917 : 20. — Balss, 1925 : 208. — Burukovsky, 1974 : 109 (key) (ed. 1983 : 153). — Phillips *et al.*, 1980 : 66.

Nephropsis suhmi - Ramadan, 1938 : 125 (in part, only Stn 33) (not Bate, 1888).

Material examined. — **Philippines.** Musorstom 1 : stn 44, 592-610 m : 2 ♀ ov. 26 and 27 mm (mnhn-as 496, 499).

Musorstom 2 : stn CP 24, 640-647 m : 1 ♀ 15 mm (mnhn-as 498). — Stn CP 25, 520-550 m : 2 ♀ 22 and 28 mm (mnhn-as 502). — Stn CP 82, 550 m : 1 ♀ 31 mm (mnhn-as 501).

Musorstom 3 : stn CP 122, 673-675 m : 1 ♂ 21 mm (mnhn-as 500. — Stn CP 123, 700-702 m : 2 ♀ 17 and 26 mm (mnhn-as 495). — Stn CP 128, 815-821 m : 2 ♂ 25 and 26 mm ; 1 ♀ 34 mm (mnhn-as 494).

Albatross : stn 5487, 10°02'45" N-125°05'33" E, 1 318 m, 31.07.1909 : 1 ♂ 19 mm ; 1 ♀ 23 mm (usnm).

Indonesia. Corindon 2 : stn CH 201, 01°11' S-117°06' E, 21 m, 30.10.1980 : 1 ♀ 12 mm (mnhn-as 505). — Stn CH 214, 00°31' N-117°50' E, 595 m, 01.11.1980 : 1 ♂ 20 mm (mnhn-as 504).

Corindon 4 : stn 2-1, 03°18' S-128°16' E, 315-483 m, 14.04.1981 : 1 ♀ 25 mm (mnhn-as 497).

Sri Lanka. Safari 2 : stn CP 06, 08°11' N-79°03' E, 1 035 m, 28.07.1981 : 2 ♂ 35 and 40 mm (mnhn-as 503).

Gulf of Aden. John Murray exp. : stn 33, 13°41'00" N-48°17'00" E, 1 295 m, 15.10.1933 : 1 ♀ 10 mm (bmnh 1937.12.7.210-215).

Description. — Carapace finely granulate. Rostrum without lateral spines. Rostral length between one-half and two-thirds the length of the rest of the carapace (not including the rostrum itself), in some small specimens as long as the rest of the carapace. Each subdorsal carina bearing two spines, one near the base of the rostrum and the other just anterior to the gastric tubercle. Some more or less acute granules between these two spines. Median groove overreaching the midpoint of the rostrum. Gastric tubercle located slightly closer to the orbital border than to the postcervical groove. Supraorbital and antennal spines well-developed and similar in size. Postsupraorbital spine smaller than these and located at the level of the proximal subdorsal spine. Grooves on carapace distinct. Postcervical groove deep, passing the dorsal midline of the carapace. Faint carinae present behind the postcervical groove. A pair of dorsal spines just behind the postcervical groove. Distance between the orbital border and the postcervical groove a little less than twice the distance between the postcervical groove and the posterior border of the carapace.

Abdomen pubescent, particularly in the grooves. Abdominal tergites on 1st to 5th segments with a conspicuous transverse groove. A dorsal carina on the abdominal tergites, barely distinct on the

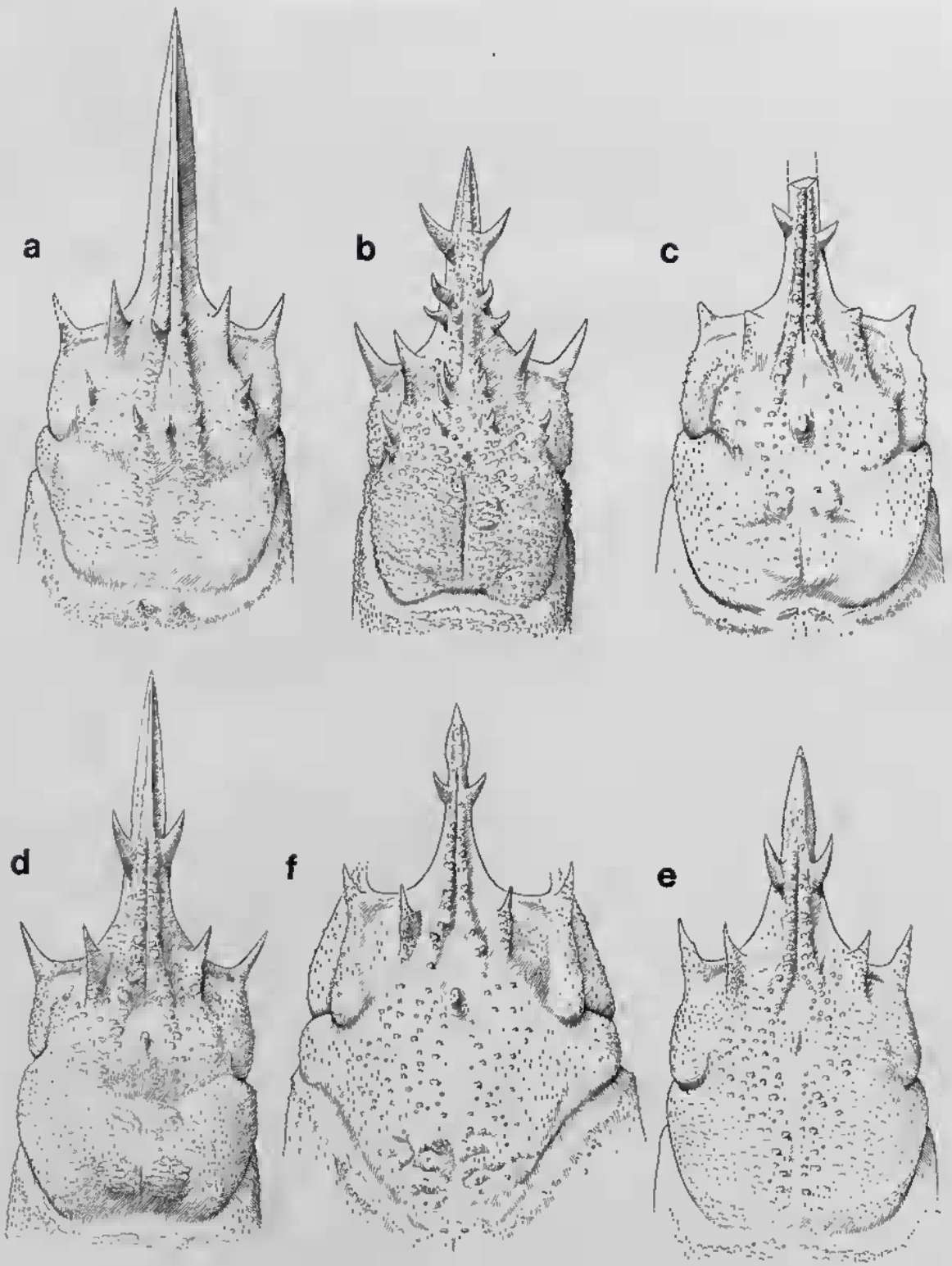

FIG. 5. — Anterior part of the carapace, dorsal view ; a, *Nephropsis ensirostris* Alcock, ♀ 34 mm, MUSORSTOM 3, Philippines, Stn 128, 815-821 m (MNHN-AS 494) ; b, *N. suhmi* Bate, ♀ 33 mm, *Vauban*, Madagascar, CH 131, 1 490-1 600 m (MNHN-AS 506) ; c, *N. occidentalis* Faxon, ♀ 38 mm, Peru, 800 m (USNM 170556) ; d, *N. acanthura* sp. nov., holotype, ♂ 36 mm, MUSORSTOM 2, Philippines, Stn 56, 970 m (MNHN-AS 546) ; e, *N. stewarti* Wood-Mason, ♂ 39 mm, *Vauban*, Madagascar, CH 33, 600-605 m (MNHN-AS 435) ; f, *N. carpenteri* Wood-Mason, ♂ 30 mm, Bay of Bengal, 357 m (BMNH 1894.5.4.4).

2nd and 3rd segments. Anterior and posterior borders of pleura granulate, spineless, terminating in a long, acute point. Anterior border of pleura of second segment more convex than those of the pleura on the remaining segments.

Chelipeds with little pubescence. Carpus with a strong anterodorsal and anteroventral spine, an inner dorsal spine at mid-length, an outer spine on terminal half, and a strong spine on inner border near palmar articulation. Carpus of second pair of pereiopods sligthly longer than the palm. Hand of third pereiopod 1.5 times carpus length. Dactylus of fourth and fifth pereiopods about two-thirds propodus length.

Coxa of second pereiopod of males and females with a rounded process. Coxa of third pereiopod of males with a process bearing a long, curved spine.

Incision on anterior border of thelycum of females rather shallow, hence thelycum not bilobate. Posterior incision broad and deep.

Exopodite of uropod with a distinct but incomplete diaeresis. External border of exopod and endopod terminating in a spine.

REMARKS. — *N. ensirostris* is readily distinguishable from the other species of the genus on account of the absence of lateral spines on the rostrum.

RAMADAN (1938), in his study of the Astacura from the John Murray Expedition, mentionned a specimen (Stn 33) without spines on the rostrum or on the anterior borders of the abdominal pleurae. Comparison of this specimen (classified as *N. suhmi*) with the specimens of *N. ensirostris* examined showed them to be conspecific, the specimen from that station in fact being a juvenile of *N. ensirostris.*

SIZE. — The males examined ranged from 17 to 40 mm long, the females from 10 to 34 mm. Ovigerous females from 26 mm.

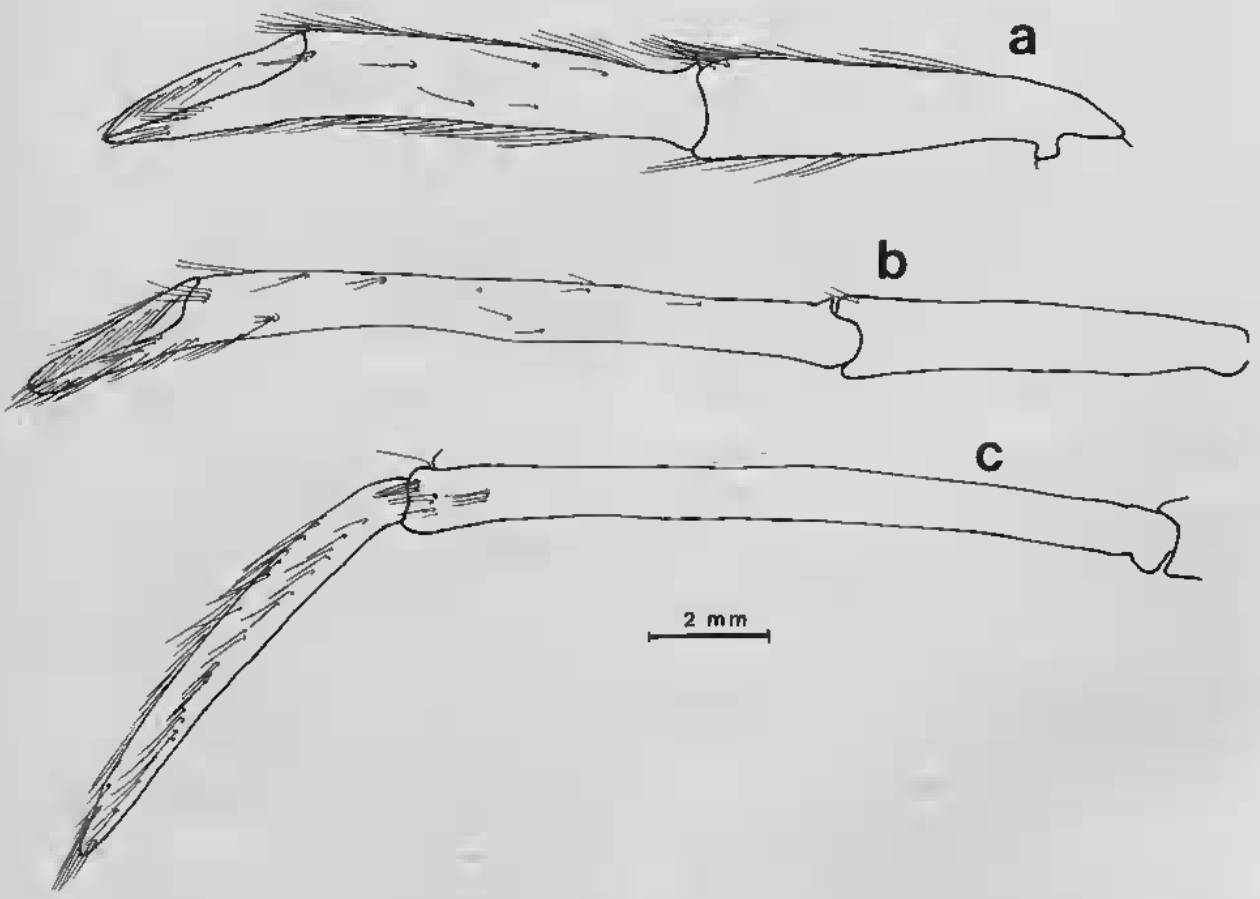

FIG. 6. — *Nephropsis ensirostris* Alcock, ♀ 34 mm, MUSORSTOM 3, Philippines, Stn 128, 815-821 m (MNHN-AS 494) : a, second pereiopod ; b, third pereiopod ; c, fourth pereiopod.

DISTRIBUTION. — Known from the Gulf of Aden, Arabian Sea, northern Laccadive Sea, south of Sri Lanka, Bay of Bengal, Andaman Sea, Indonesia and the Philippine Islands. Depths between 315 and 1 300 m.

Nephropsis suhmi Bate, 1888

Figs 5 b, 7 d-f, 8 c-d, 16 b

Nephropsis suhmi Bate, 1888 : 181, pl. 13, fig. 3, pl. 24, fig. 2. — ANDERSON, 1897 : 96. — RAMADAN, 1938 : 125 (in part, only Stn. 62 and 158). — BURUKOVSKY, 1974 : 109 (key) (ed. 1983 : 154). — PHILLIPS *et al.*, 1980 : 66.

Nephropsis Suhmi - ALCOCK, 1899 : 33 ; 1901a : 158 (key), 163. — DE MAN, 1916 : 97, 112 (key), 114. — BOUVIER, 1917 : 21. — BALSS, 1925 : 208.

Nephrosis orientalis Bate, 1888 : 171, 175 (nomen nudum).

MATERIAL EXAMINED. — **Madagascar.** *Vauban* : CH 126, 17°50′ S-43°07′ E, 1 475-1 530 m, 16.01.1975 : 4 ♂ 24 to 59 mm ; 6 ♀ 26 to 47 mm (MNHN-AS 507). — CH 131, 13°46′ S-47°33′ E, 1 490-1 600 m, 20.01.1975 : 2 ♂ 36 and 43 mm ; 4 ♀ 25 to 33 mm (MNHN-AS 506). — CH 141, 13°40.3′ S-47°32.5′ E, 1 600-1 725 m, 28.02.1975 : 1 ♀ 28 mm (MNHN-AS 508).

New Caledonia. BIOCAL : stn CP 69, 23°52′ S-167°58′ E, 1 220-1 225 m, 03.09.1985 : 1 ♂ 31 mm (MNHN-AS 509).

BIOGEOCAL : stn CP 238, 21°27.64′ S-166° 23.41′ E, 1 260-1 300 m, 13.04.1987 : 1 ♂ 39 mm (MNHN-AS 529).

Indonesia. *Challenger* : stn 191, 05°41′ S-134° 4′30″ E, 1 464 m, 23.09.1874 : 1 juv., holotype, 10.1 mm (BMNH 88.22).

Arabian Sea. JOHN MURRAY EXP. : stn 62, 22°53′30″ N-64°56′10″ E, 1 893 m, 18.11.1933 : 4 ♂ 9 to 26 mm ; 6 ♀ 9 to 24 mm (BMNH 1937.12. 7.210-215).

Maldive Sea. JOHN MURRAY EXP. : stn 158, 4°42′30″ N-72°42′30″ E, 786-1 170 m, 7.04.1934 : 1 ♀ 8 mm (BMNH 1937.12.7.210-215).

Australia. CIDARIS 1 : stn 18-1, 17°45.44′ S-148°01.03′ E, 1 132-1 147 m, 10.05.1986 : 1 ♂ 38 mm. — Stn 30-2, 17°18.96′ S-147°11.16′ E, 1 402-1 406 m, 12.05.1986 : 1 ♀ 33 mm. — Stn 30-4, 17°19.12′ S-147°11.20′ E, 1 285-1 403 m, 12. 05.1986 : 1 ♂ 45 mm. — Stn 32-2, 17°05.89′ S-147°11.85′ E, 1 517-1 539 m, 13.05.1986 : 4 ♂ 31 to 46 mm ; 1 ♀ 22 mm. — Stn 35-3, 16°50.83′ S-147°10.61′ E, 1 607-1 609 m, 13.05.1986 : 1 ♀ 22 mm. — Stn 35-4, 16°54.54′ S-147°14.35′ E, 1 473-1 590 m, 14.05.1986 : 2 ♀ 33 and 37 mm (JCU).

DESCRIPTION. — Carapace covered with numerous granules of varying size, more numerous on the anterior half and more developed in adults than in juveniles. Rostrum bearing two pairs of strong lateral spines, sometimes one or two additional spines as well. Terminal pair located somewhat behind the midpoint of the rostrum. Median groove failing to reach the distal pair of lateral spines. Rostral length more than one-half the length of the rest of the carapace. Distance between the orbital border and the postcervical groove about 1.5 times the distance between the postcervical groove and the posterior border of the carapace (sometimes a little longer in the smallest specimens examined). Each subdorsal carina with two-three spines and several granules. Gastric tubercle closer to the supraorbital spine than to the postcervical groove. Supraorbital spine well-developed. Postsupraorbital spine present (in the holotype on the left side only), placed somewhat in front of the gastric tubercle. Usually a small spine present behind the postsupraorbital spine.

Conspicuous grooves on carapace. Postcervical groove deep, crossing the dorsal midline. Carinae posterior to the postcervical groove indistinct.

Abdominal segments bearing some granules smaller than those on the carapace. Some tufts of short setae scattered on the dorsa of the tergites. Abdominal tergites on 1st to 5th segments with a distinct transverse groove dorsally that is discontinuous medially. Abdominal pleura of 2nd to 5th segments slightly convex, with a well-developed spine terminating in a long, acute point on the anterior border, occasionally absent on the fifth segment.

Chelipeds bearing numerous granules on all articles together with long setae, more densely packed on the fingers. Carpus with a well-developed anterodorsal spine. Outer surface of carpus bearing several spines (the anteriormost the strongest) medially and another spine on the anteroventral angle. Inner surface with a spine on the anteroventral angle and another medially

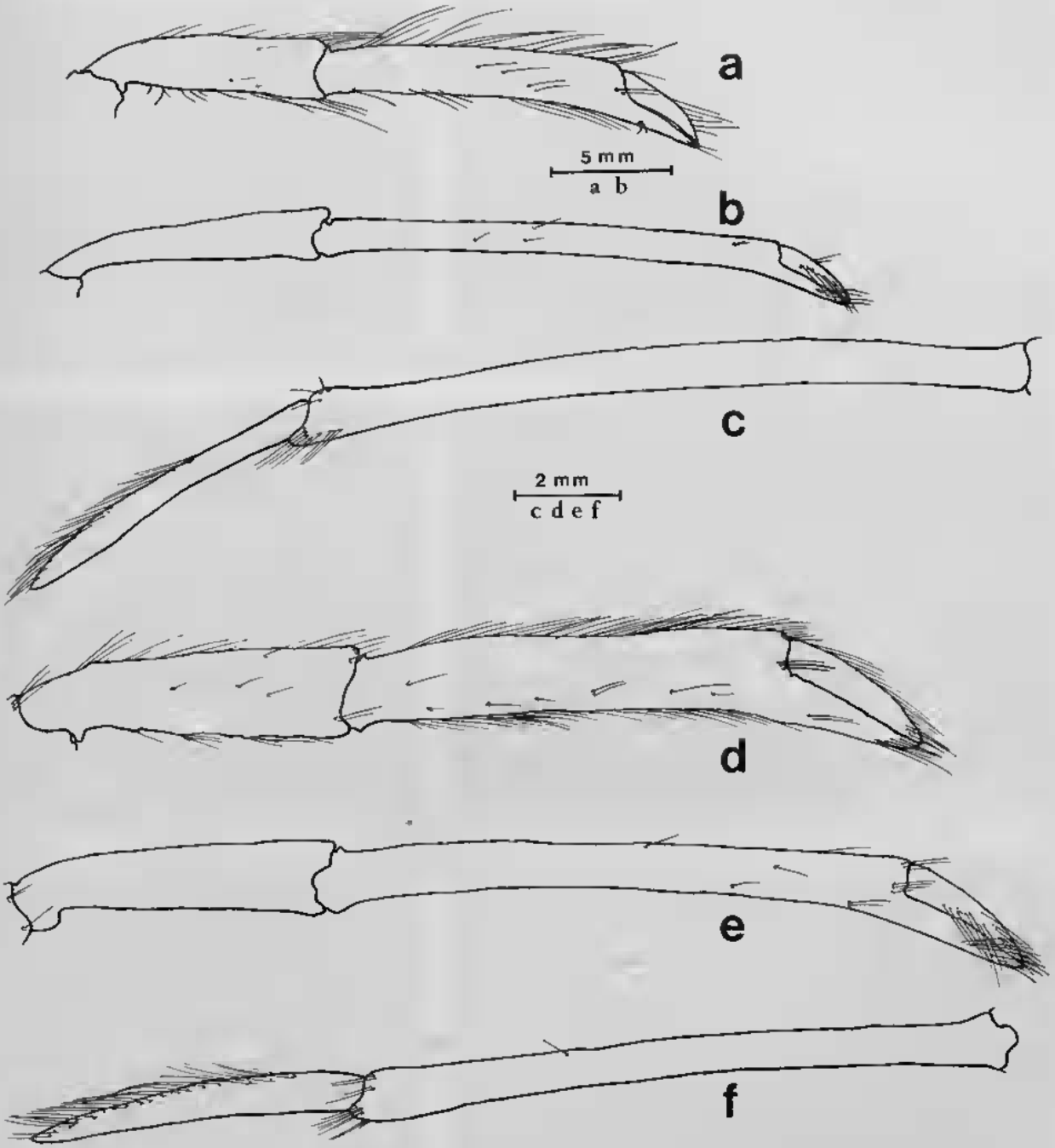

FIG. 7a-c. — *Nephropsis agassizii* A. Milne Edwards, ♀ 42 mm, Gulf of Mexico (USNM 173390) : a, second pereiopod ; b, third pereiopod ; c, fifth pereiopod.

FIG. 7d-f. — *Nephropsis suhmi* Bate, ♀ 33 mm, *Vauban*, Madagascar, CH 131, 1 490-1 600 m (MNHN-AS 506) : d, second pereiopod ; e, third pereiopod ; f, fifth pereiopod.

below the upper border. Distal half of upper border with a row of spines differing in size. Inner anterior angle bearing a spine. Hand somewhat less than twice as long as high. Carpus of second pereiopod more than two-thirds hand length. Carpus of third pereiopod somewhat more than one-half hand length. Dactyli of fourth and fifth pereiopods somewhat more than one-half propodus length.

Coxal process on second pair of pereiopods of males and females terminating in a more or less acute angle. Coxal process on third pair of pereiopods terminating in three to five well-developed teeth in males, in a single tooth in females.

Thelycum of females located between the fourth pair of pereiopods and bearing a deep median furrow over the entire length. The two lobes on the anterior border rather indistinct. A broad, triangular incision on the posterior portion.

Granules on outer surface of exopod and endopod of uropod. Exopod lacking a diaeresis.

REMARKS. — *N. agassizii* Smith, from the Northwest Atlantic, is the closest species to *N. suhmi* (Fig. 7). These two species differ from the other species of the genus in lacking a diaeresis on the exopod of the uropod. *N. agassizii* (1 ♂, RMNH 26371 ; 1 ♀, 1 ♂, RMNH 30406 ; 1 ♀, RMNH 29412 ; 1 ♀, RMNH 29408 ; 1 ♀ ov., RMNH 29508 ; 2 ♀, 1 ♂, RMNH 29406 ; 1 ♂, 1 ♀, USNM 173390) is readily differentiable from *N. suhmi* by such features as :

(a) Dactylus of fifth pereiopod more than one-half propodus length in *N. suhmi*, less than one-half in *N. agassizii*.

(b) In adult specimens (> 30 mm carapace length) the distance between the orbital margin and the postcervical groove about 1.5 times the distance between the postcervical groove and the posterior margin of the carapace in *N. suhmi*, about 2 times in *N. agassizii*.

SIZE. — The holotype measures 10.1 mm in length (rostrum 4.3 mm). The males examined ranged from 9 to 59 mm, the females from 8 to 47 mm.

DISTRIBUTION. — The species has been reported from Indonesia, New Caledonia, Arabian Sea, Maldive Is., and Madagascar. Depths between 786 and 1 893 m.

Nephropsis occidentalis Faxon, 1893

Figs 5 c, 8 e-f, 9 a-c, 16 c

Nephropsis occidentalis Faxon, 1893 : 195 ; 1895 : 127, pl. D, figs 1, 1 a, 1 b. — DE MAN, 1916 : 97 (key). — BOUVIER, 1917 : 20 (key). — BALSS, 1925 : 208. — BAHAMONDE, 1959 : 224, figs 1-4 ; 1963 : unnumbered page. — MANNING, 1970 : 867, figs 1-3 ; 1982 : 359, unnumbered figure. — DEL SOLAR, 1972 : 10. — BURUKOVSKY, 1974 : 109 (key) (ed. 1983 : 154). — RETAMAL, 1977 : 359, unnumbered fig. ; 1981 : 17, fig. 45. — LUKE, 1977 : 22. — PHILLIPS *et al.*, 1980 : 66. — WICKSTEN & MENDEZ, 1982 : 110.

MATERIAL EXAMINED. — **Mexico**. *Albatross* : stn 3418, 16°33′ N-99°52′30″ W, 1 221 m, 11.04. 1891 : 1 ♂ 43 mm ; 1 ♀ 47 mm (syntypes, RMNH 25623).

Peru. 10°45.8′ S-78°36.4′ W, 824 m, 15.05.1971 : 1 ♂ 43 mm ; 1 ♀ 46 mm (RMNH 27212). — 03°51′ S-81°18′ W, 800 m, 01.1971 : 2 ♀ 38 and 43 mm (USNM 170556).

DESCRIPTION. — Carapace subsmooth, pubescent. Rostrum less than one-half the length of the rest of the carapace. A single pair of lateral spines placed midway along the rostrum. Rostral median groove overreaching the level of the lateral spines without overreaching the terminal third of the rostrum. Subdorsal carinae granulate. Supraorbital spine present, somewhat smaller than the lateral rostral spines in size. No postsupraorbital spine. Distance between the level of the supraorbital spines and the gastric tubercle a little more than one-half the distance between the gastric tubercle and the postcervical groove. Distinct grooves and carinae on carapace. Postcervical groove shallow, crossing the dorsal midline. Carinae behind the postcervical groove low and faint. Distance between the orbital border and the postcervical groove about twice the distance between the postcervical groove and the posterior border of the carapace.

Tergites on abdominal segments pubescent. A median carina on the 2nd to 6th segments. Pleura slightly pubescent. Anterior border of pleuron on second segment much more convex than those on the pleura on the other segments. All pleura ending in a short, acute point. Anterior borders granulate, without spines, less convex

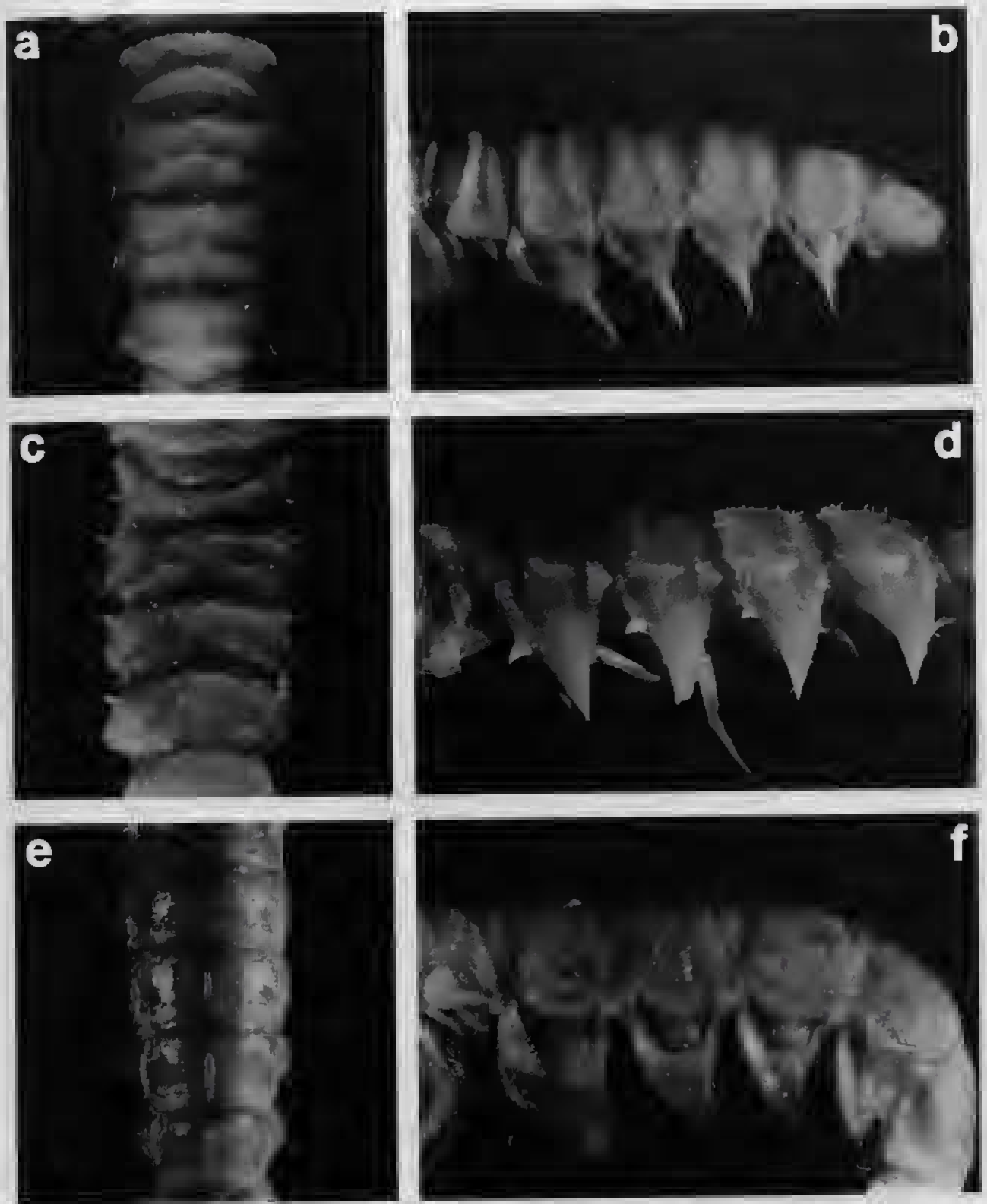

FIG. 8a-b. — *Nephropsis ensirostris* Alcock, ♀ 34 mm, MUSORSTOM 3, Philippines, Stn 128, 815-821 m (MNHN-AS 494) : Anterior part of the abdomen : a, dorsal view ; b, lateral view.

FIG. 8c-d. — *Nephropsis suhmi* Bate, ♀ 33 mm, *Vauban*, Madagascar, CH 131, 1 490-1 600 m (MNHN-AS 506) : Anterior part of the abdomen : a, dorsal view ; b, lateral view.

FIG. 8e-f. — *Nephropsis occidentalis* Faxon, ♀ 38 mm, Peru, 800 m (USNM 170556) : Anterior part of the abdomen : e, dorsal view ; f, lateral view.

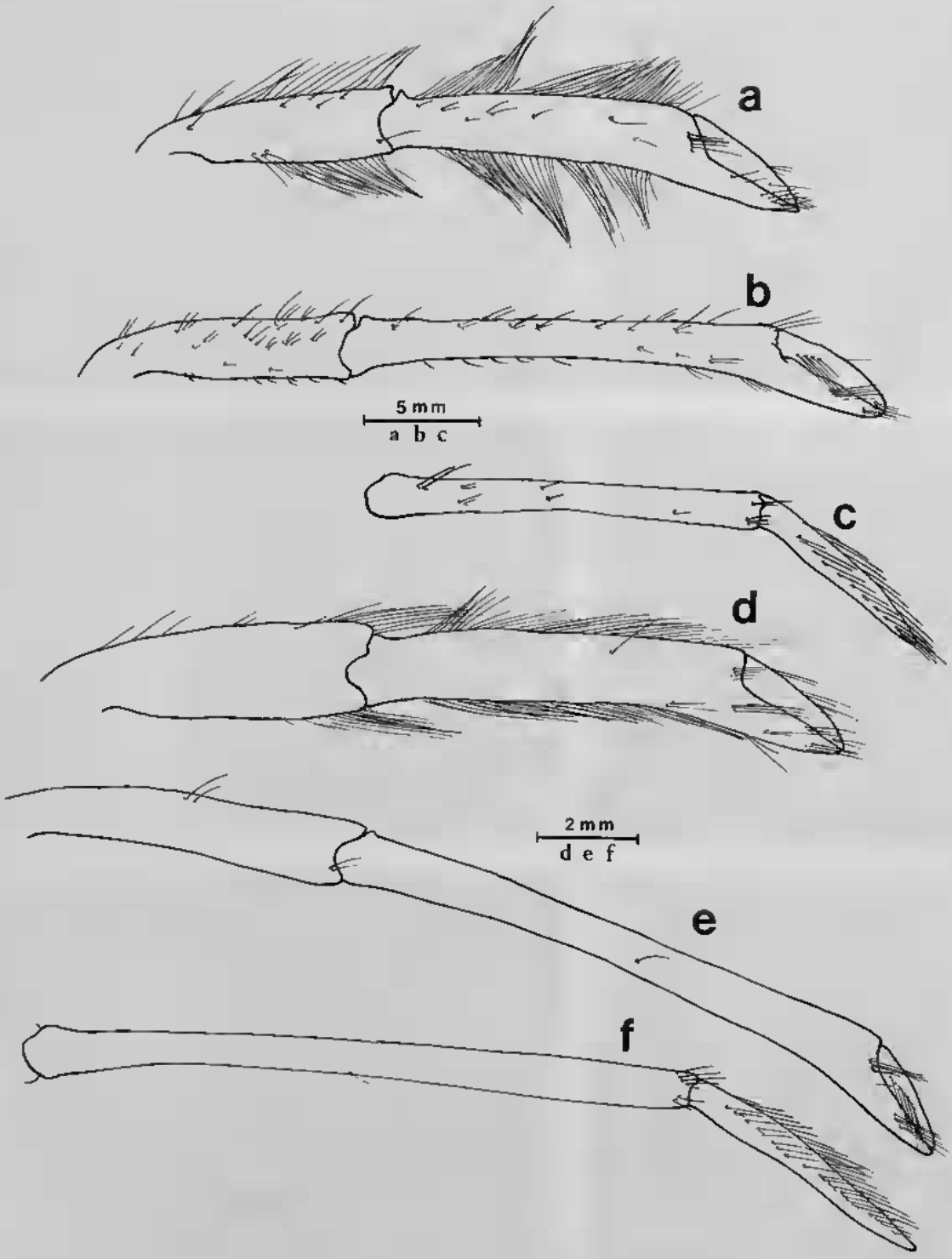

FIG. 9a-c. — *Nephropsis occidentalis* Faxon, ♀ 38 mm, Peru, 800 m (USNM 170556) : a, second pereiopod ; b, third pereiopod ; c, fourth pereiopod.

FIG. 9d-f. — *Nephropsis acanthura* sp. nov., paratype ♂ 30 mm, MUSORSTOM 5, New Caledonia, Stn 323, 970 m (MNHN-AS 517) : d, second pereiopod ; e, third pereiopod ; f, fourth pereiopod.

than the anterior border on the second segment. Telson bearing a strong, well-developed spine on the centre of the basal portion.

First pair of chelipeds with long setae but not densely pubescent. Merus with a subdistal spine dorsally and another on the inner anterior angle. Carpus with a long anterodorsal spine and another, smaller, anteroventral spine. A long spine on the inner anterior border near the articulation. Some thick granules scattered on the dorsal and outer margins. A strong spine medially on the dorsal border. Carpus of second pair of pereiopods somewhat smaller than hand length; carpus of third pair of pereiopods two-thirds hand length. Dactyli of fourth and fifth pereiopods more than one-half propodus length.

Coxal process on second pair of pereiopods of males and females terminating in a sharp process. Coxae on third pair of pereiopods in males with a triangular projection the posterior portion of which is recurved, bearing some denticles or spines in some specimens. Thelycum of females raised, anterior border ending in a rounded lobe. Posterior incision broad.

Exopod of uropod with a conspicuous, well-developed diaeresis. Outer border of exopods and endopods terminating in a spine.

REMARKS. — *N. occidentalis* is similar to *N. acanthura* sp. nov., the only two species of the genus to have a dorsal spine near the anterior margin of the telson. However, the two species are differentiated by several characters (see below, p. 312).

SIZE. — The males examined measured 43 mm. The females were between 38 and 47 mm. FAXON (1893) reported a female that measured 119 mm total length and 51 mm carapace length.

DISTRIBUTION. — West coast of America from Mexico to Chile. Depths between 800 and 1 250 m.

Nephropsis acanthura sp. nov.

Figs 5 d, 9 d-f, 11 a-b, 16 d

MATERIAL EXAMINED. — **Madagascar.** *Vauban* : CH 109, 22°16.9′ S-42°56′ E, 1 200 m, 30.11.1973 : 9 ♂ 18 to 24 mm ; 5 ♀ 15 to 26 mm (MNHN-AS 510). — CH 142, 13°45.6′ S-47°34.2′ E, 1 250-1 300 m, 28.02.1975 : 1 ♂ 18 mm ; 3 ♀ 17 to 20 mm (MNHN-AS 511).

Philippines. MUSORSTOM 1: stn CP 49, 750-925 m : 1 ♂ 16 mm (MNHN-AS 516). — Stn CP 54, 975-1 075 m : 1 ♀ 19 mm (MNHN-AS 515).

MUSORSTOM 2 : stn CP 56, 970 m : 1 ♂ 36 mm (MNHN-AS 546).

New Caledonia. BIOCAL : stn CP 31, 23°08′ S-166°51′ E, 850 m : 1 ♀ 26 mm (MNHN-AS 514).

Chesterfield Islands. MUSORSTOM 5 : stn CP 323, 970 m : 2 ♂ 26 and 30 mm ; 2 ♀ 19 and 30 mm (MNHN-AS 513, 517). — Stn CP 324, 970 m : 2 ♀ 17 and 29 mm (MNHN-AS 512).

Australia. CIDARIS 1 : stn 3-1, 18°08.22′ S-147°48.05′ E, 1 044-1 067 m, 06.05.1986 : 1 ♂ 32 mm. — Stn 8-1, 18°07.82′ S-148°15.39′ E, 1 115-1 119 m : 1 ♀ 28 mm. — Stn 14-1, 17°49.45′ S-148°39.51′ E, 990-1 006 m, 08.05.1986 : 2 ♂ 21 and 32 mm. — Stn 15-4, 17°45.99′ S-148°39.09′ E, 958-964 m, 09.05.1986 : 3 ♂ 21 to 36 mm ; 1 ♀ ov. 34 mm (JCU).

TYPES. — The male from MUSORSTOM 2, Stn CP 56, 36 mm (MNHN-AS 546) has been selected as holotype. The female from BIOCAL, Stn CP 31, 26 mm (MNHN-AS 514) is the allotype. The other specimens are paratypes.

DESCRIPTION. — Carapace finely granulate and sparsely pubescent. Rostrum with a pair of strong lateral spines placed midway along its length. Rostrum more than one-half the length of the rest of the carapace. Median groove on rostrum terminating at the level of the lateral rostral spines. Subdorsal carinae granulate with some small spines on the posterior portion placed somewhat behind the level of the supraorbital spine and reduced to small granules in some specimens. Sometimes one or two small postsupraorbital spines or acute granules. Distance between the level of the supraorbital spines and the gastric tubercle around one-half the distance between the gastric tubercle and the postcervical groove. Postcervical, cervical, and hepatic grooves distinct, the postcervical groove passing the dorsal midline. Carinae on the posterior portion of the carapace poorly developed. Distance between the orbital border and the postcervical groove somewhat more than twice the distance between the postcervical groove and the posterior border of the carapace.

Second to sixth abdominal sometimes with a conspicuous median carina covered with short but dense pubescence. Anterior border of abdominal pleura spineless. Anterior border of pleuron of second abdominal segment weakly convex, terminating in a long, acute point. Anterior borders of 3rd to 5th segments less convex than anterior border of second segment, also ending in a long, acute point. A strong dorsal spine near the base of the telson.

Merus of first pair of chelipeds with a subdistal dorsal spine. Carpus with a strong anterodorsal spine and another strong spine on the inner dorsal border midway along its length. Outer border without spines. A strong spine on the inner margin near the articulation with the palm. Carpus of second pair of pereiopods somewhat shorter than the palm ; carpus of third pair of pereiopods about two-thirds the size of the palm. Dactyli of fourth and fifth pereiopods less than one-half propodus length.

Coxal process on second pereiopod of males and females rounded. Coxal process on third pereiopod of males wide, with four-five sharp teeth, that of females toothless. Thelycum of females raised, anterior margin rounded. Posterior incision broad.

Exopod of uropod with a conspicuous, fully formed diaeresis. Outer border of exopods and endopods terminating in a spine.

REMARKS. — *N. acanthura* is closely related to *N. occidentalis* Faxon from the west coast of America. Both differ from all the other known species in the genus *Nephropsis* in having an erect dorsal spine near the anterior margin of the telson. The two species are differentiated by the following characters :

(a) Carapace smooth in *N. occidentalis*, with numerous small granules in *N. acanthura*.

(b) Rostrum more tban one-half the length of the rest of the carapace in *N. acanthura*, clearly less than one-half in *N. occidentalis*.

(c) Anterior margin of second abdominal pleuron strongly convex in *N. occidentalis*, slightly convex in the new species. Furthermore, pleura of the second to fifth segments ending in a long, acute point in *N. acanthura* ; the points on these pleura shorter and less acute in *N. occidentalis*.

(d) Dactyli of fourth and fifth pereiopods less than one-half propodus length in *N. acanthura*, more than one-half in *N. occidentalis*.

ETYMOLOGY. — The name *acanthura* comes from the Greek, " akantha ", thorn, prickle, in reference to the erect dorsal spine on the telson.

SIZE. — The males examined ranged between 16 and 30 mm, the females between 15 and 30 mm.

DISTRIBUTION. — Off Madagascar, the Philippines, and New Caledonia, from 750 to 1 300 m.

Nephropsis stewarti Wood-Mason, 1873

Figs 5 e, 10, 11 c-d, 16 e

Nephropsis Stewarti Wood-Mason, 1873 a : 60 : 1873 b : 40, pl. 4 ; 1876 : 231 ; 1885 : 71. — A. MILNE EDWARDS, 1874 : pl. 20, figs 1-3. — ALCOCK & ANDERSON, 1896 : pl. 27, fig. 1 a ; 1899 : 286. — ANDERSON 1897 : 96. — ALCOCK, 1899 : 33 ; 1901a : 158 (key), 159. — LLOYD, 1907 : 3. — DE MAN, 1916 : 97, 111 (key). — BOUVIER, 1917 : 21. — BALSS, 1925 : 208.

Nephropsis stewarti - STEBBING, 1893 : 206. — THOMPSON, 1901 : 17. — ALCOCK, 1902 : 148. — CALMAN, 1925 : 21. — BOUVIER, 1925 : 412. — BARNARD, 1950 : 531. — ANONYMOUS, 1954 : 756, fig. 2179. — SEWELL, 1955 : 203. — HOLTHUIS, 1956 : 113 ; 1984 : unnumbered pages and figures. — HEMMING, 1959 : 285. — KUBO, 1965 : 629, fig. 1031. — SAKAI & YAMASHITA, 1968 : 43, fig. h. — BERRY, 1969 : 45. — NISHIMURA & SUZUKI, 1971 : 87. — CROSNIER & JOUANNIC, 1973 : 13. — BURUKOVSKY, 1974 : 109 (key) (ed. 1983 : 154). — MIYAKE, 1975 : 106, unnumbered figure ; 1982 : 77, pl. 26, fig. 1. — PHILLIPS *et al.*, 1980 : 66. — KENSLEY, 1981 : 29. — ABELE & FELGENHAUER, 1982 : 309, unnumbered figure. — GEORGE, 1983 : 19. — THOMAS, 1984 : 43. — BABA, 1986 : 153, 281, fig. 103.

Nephropsis stewartii - ALCOCK & ANDERSON, 1894 : 161. — RAMADAN 1938 : 124, fig. 1.

Nephropsis sp. - CHUN, 1900 : 366, unnumbered figure ; 1903 : 566, unnumbered figure.

MATERIAL EXAMINED. — **Madagascar.** *Vauban* : CH 21, 12°27.7' S-48°12.5' E, 600-605 m, 19.01.1972 : 1 ♂ 42 mm ; 2 ♀ 32 and 46 mm (MNHN-AS 471). — CH 23, 12°26.2' S-48°13' E, 600-605 m, 19.01.1975 : 9 ♂ 26 to 59 mm ; 7 ♀ 31

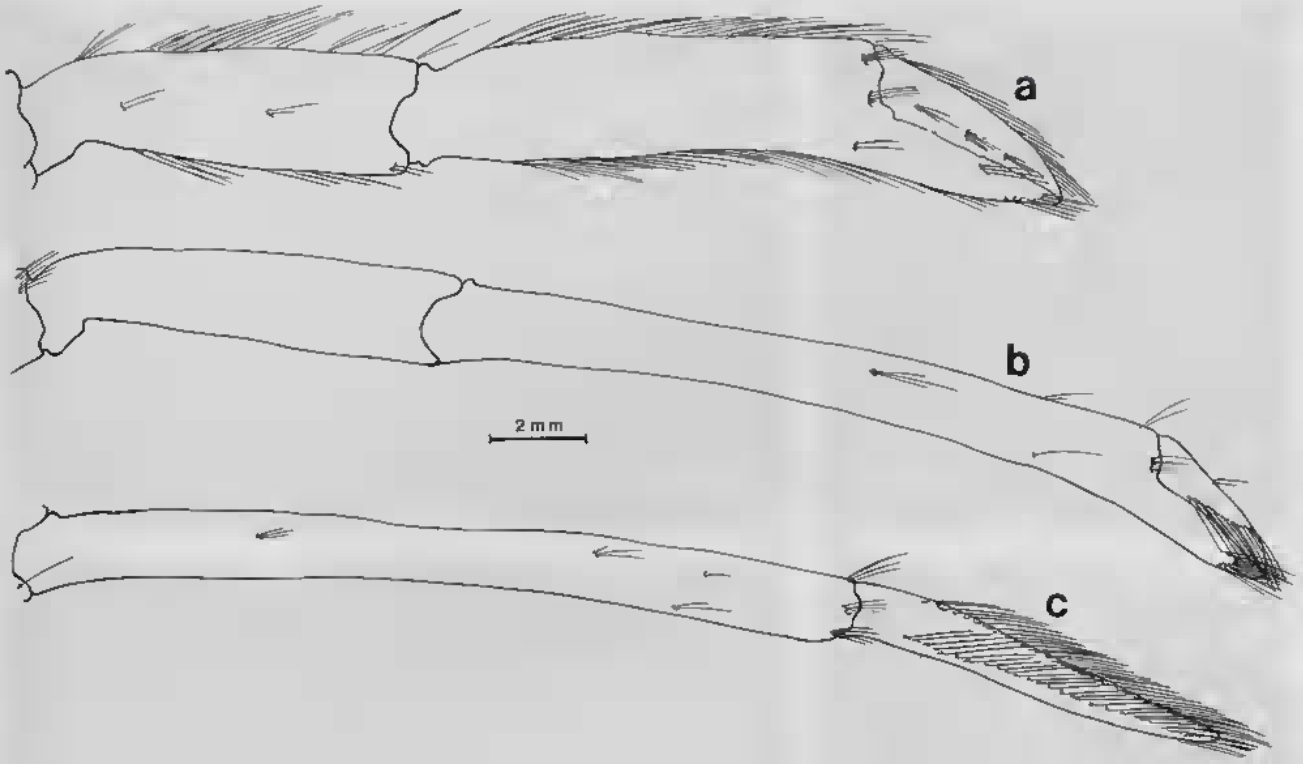

FIG. 10. — *Nephropsis stewarti* Wood Mason, ♀ 46 mm, *Vauban*, Madagascar, CH 21, 600-605 m (MNHN-AS 471) : a, second pereiopod ; b, third pereiopod ; c, fourth pereiopod.

and 56 mm ; 2 ♀ ov. 50 and 54 mm (MNHN-AS 470). — CH 33, 12°28.1′ S-48°12.2′ E, 600-605 m, 13.09.1972 : 2 ♂ 31 and 39 mm ; 2 ♀ 39 and 40 mm (MNHN-AS 435). — CH 48, 15°18′ S-46°12.1′ E, 480-510 m, 08.11.1972 : 1 ♂ 35 mm ; 1 ♀ 22 mm (MNHN-AS 433, 472). — CH 56, 23°36′ S-43°31.6′ E, 395-410 m, 26.02.1973 : 4 ♂ 36 to 42 mm (MNHN-AS 473). — CH 65, 23°35′ S-43°28.6′ E, 740-760 m, 29.02.1973 : 1 ♂ 59 mm (MNHN-AS 434).

Macareignes III : CH 3, 22°18.3′ S-43°05.6′ E, 350 m, 20.12.1985 : 4 ♂ 38 to 45 mm ; 2 ♀ ov. 42 and 43 mm ; 5 ♀ 40 to 43 mm (MNHN-AS 364). — CH 6, 22°27.5′ S-43°06.2′ E, 425-450 m, 21.12.1985 : 3 ♂ 29 to 35 mm ; 3 ♀ 28 to 39 mm (MNHN-AS 365). — CH 7, 22°17.4′ S-43°04.8′ E, 400-425 m, 22.12.1985 : 3 ♂ 27 to 37 mm (MNHN-AS 366). — CH 28, 22°30′ S-43°07′ E, 450 m, 15.01.1986 : 4 ♂ 27 to 37 mm ; 6 ♀ 28 to 40 mm (MNHN-AS 352). — CH 37, 22°26.5′ S-43°05.6′ E, 450-475 m, 21.01.1986 : 1 ♂ 47 mm (MNHN-AS 363). — CH 42, 22°22.9′ S-43°04.7′ E, 395-425 m, 22.01.1986 : 2 ♀ 38 and 39 mm (MNHN-AS 362). — CH 63, 22°26.8′ S-43°05.4′ E, 530 m, 20.12.1986 : 2 ♂ 57 and 66 mm (MNHN-AS 426). — CH 69, 22°21.9′ S-43°04.8′ E, 350-420 m, 21.10.1986 : 2 ♀ 40 and 42 mm (MNHN-AS 474). — CH 78, 22°20.5′ S-43°03.1′ E, 530 m, 24.01.1986 : 3 ♂ 36 to 57 mm (MNHN-AS 427). — CH 81, 22°22.8′ S-43°03.3′ E, 525 m, 25.10.1986 : 1 ♀ 51 mm (MNHN-AS 429). — CH 108, 22°15.4′ S-43°00.8′ E, 800 m, 26.11.1986 : 1 ♀ 45 mm (MNHN-AS 430). — CH 113, 22°11.3′ S-43°02.3′ E, 650 m, 27.11.1986 : 1 ♀ 23 mm (MNHN-AS 432). — CH 117, 22°15′ S-43°06.5′ E, 370 m, 28.11.1986 : 1 ♀ 41 mm (MNHN-AS 431). — CH 122, 22°16.8′ S-43°02.7′ E, 600 m, 30.11.1986 : 1 ♂ 47 mm ; 1 ♀ 51 mm (MNHN-AS 428). — CH 123, 22°16.7′ S-43°00.6′ E, 800 m, 30.11.1986 : 1 ♂ 71 mm ; 1 ♀ 50 mm (MNHN-AS 425).

Philippines. MUSORSTOM 1 : stn 47, 685-757 m : 1 ♂ 39 mm ; 1 ♀ 49 mm (MNHN-AS 475). — Stn 50, 415-510 m : 4 ♂ 22 to 36 mm ; 5 ♀ 14 to 30 mm (MNHN-AS 478, 480). — Stn 51, 170-200 m : 1 ♀ 27 mm (MNHN-AS 479).

MUSORSTOM 2 : stn CP 44, 760-820 m : 1 ♀ 70 mm (MNHN-AS 476). — Stn CP 75, 300-330 m : 1 ♀ 35 mm (MNHN-AS 482).

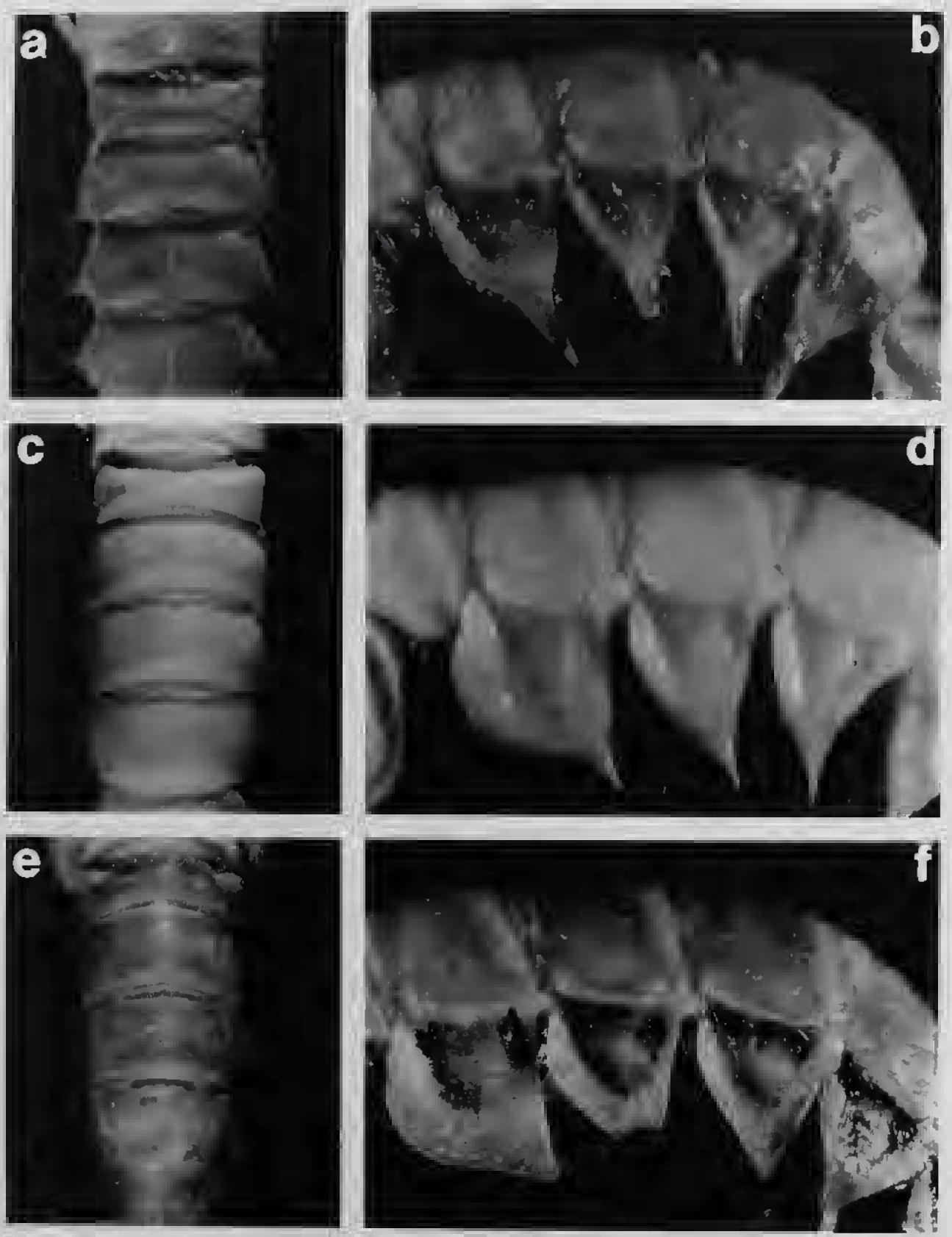

FIG. 11a-b. — *Nephropsis acanthura* sp. nov., holotype ♂ 36 mm, MUSORSTOM 2, Philippines, Stn 56, 970 m (MNHN-AS 546) : Anterior part of the abdomen : a, dorsal view ; b, lateral view.

FIG. 11c-d. — *Nephropsis stewarti* Wood Mason, ♂ 39 mm, *Vauban*, Madagascar, CH 33, 600-605 m (MNHN-AS 435) : Anterior part of the abdomen : c, dorsal view ; d, lateral view.

FIG. 11e-f. — *Nephropsis carpenteri* Wood Mason, ♂ 30 mm, Bay of Bengal, 357 m (BMNH 1894.5.4.4) : Anterior part of the abdomen : e, dorsal view ; f, lateral view.

MUSORSTOM 3 : stn CP 105, 398-417 m : 1 ♂ 38 mm (MNHN-AS 487). — Stn CP 118, 448-466 m : 1 ♀ 36 mm (MNHN-AS 486). — Stn CP 122, 673-675 m : 1 ♀ 15 mm (MNHN-AS 484). — Stn CP 123, 700-702 m : 1 ♂ 23 mm (MNHN-AS 488). — Stn CP 128, 815-821 m : 1 ♂ 42 mm ; 1 ♀ 56 mm (MNHN-AS 477). — Stn CP 135, 486-551 m : 1 ♀ 35 mm (MNHN-AS 485).

Albatross : stn 5260, 12°25'35" N-121°31'35" E, 428 m, 03.06.1908 : 1 ♂ 45 mm ; 1 ♀ 34 mm. — Stn 5537, 09°11' N-123°23' E, 470 m, 19.08.1909 : 1 ♂ 33 mm ; 1 ♀ 35 mm (USNM).

Gulf of Aden. JOHN MURRAY EXP. : stn 34, 13°05'36" N-46°24'42" E, 1 022 m, 16.10.1933 : 1 ♂ 57 mm (BMNH). — Stn 193, 13°06'12" N, 46°24'30" E, 1 061-1 080 m, 07.05.1934 : 1 ♀ 58 mm (BMNH 1937.12.7.210-215).

Andaman Sea : 11°31'46" N-92°46'40" E, 348-407 m : 1 ♂ 45 mm (BMNH 1894.5.11.3). — 11°31'40" N-92°46'40" E, 210-344 m : 1 ♂ 52 mm (USNM).

South Africa. *Africana* : stn TO5, 30°06.6' S-31°10.1' E, 474 m, 26.08.1986 : 1 ♀ 23 mm (ICM 1036).

DESCRIPTION. — Carapace slightly granulate. Rostrum with one pair of lateral spines located midway along the length of the rostrum. Rostral length sligthly longer than one-half the rest of the carapace. Median groove overreaching the lateral spines. Subdorsal carinae granulate, without spines. Supraorbital spine and antennal spine approximately the same size as the rostral spines. No postsupraorbital spine present. Distance between the gastric tubercle and the supraorbital spine, measured along the median line of the carapace, slightly less than one-half the distance between the gastric tubercle and the postcervical groove. Postcervical, cervical, and hepatic grooves distinct. Postcervical groove deep, crossing the median line of the carapace. Intermediate and lateral carinae also distinct. Distance between the orbital margin and postcervical groove more than 1.5 times the distance between the postcervical groove and the posterior border of the carapace.

Second to sixth abdominal somites without longitudinal carinae dorsally. Tergum densely pubescent, unlike the greater part of the surface of the pleura, which is smooth and bright. Anterior margin of pleuron of second segment convex, ending in a long, sharp point. Anterior margins of pleura of 3rd to 5th somites less convex than the anterior margin of the pleuron on the 2nd somite, ending in a long, acute point. None of the anterior margins bearing a spine or tooth.

First chelipeds densely pubescent, mainly on the outer and upper surfaces of the merus, carpus, and chela. Chela about 1.7 times longer than high. Carpus with an anterodorsal and an anteroventral spine. Two spines on the dorsal margin, midway along the length of the carpus. Outer margin spineless. A spine on the inner anterior margin near the articulation of the palm. Carpus of second pereiopod slightly shorter then the palm. Carpus on third leg 0.6 times palm length. Dactyli of fourth and fifth legs about one-half as long as the propodus.

Coxa of second pereiopod in males and females bearing a small, rounded process. Process on coxa of third leg of males rounded and not very broad, ending in a single, high, sharp tooth on the outer surface near the articulation with the basis. A small, rounded process medially on the posterior border. Coxa in females rounded, without a process.

Thelycum of females raised, anterior border bilobate, the lobes separated by a wide incision. Posterior border with a deep incision, broader than that on the anterior border.

Outer lobe of uropodal protopodite ending in a spine. Inner lobe with a distinct spine. Uropodal exopod bearing a distinct and complete diaeresis.

REMARKS. — *N. stewarti* belongs to the group of species with one pair of lateral spines on the rostrum, no spines on the anterior borders of the abdominal pleurae, and a diaeresis on the exopod of the uropod.

The closest species are *N. rosea* Bate and *N. aculeata* Smith from the Western Atlantic and *N. carpenteri* Wood-Mason from the Bay of Bengal. These species are easily distinguished by the presence of a distinct median carina on the second to sixth abdominal tergites ; this median carina is absent in *N. stewarti*.

SIZE. — The males examined ranged between 22 and 71 mm, females between 14 and 70 mm. Ovigerous females from 42 mm.

DISTRIBUTION. — The species has been caught in the waters of Madagascar, Natal, Mozam-

bique, Kenya, the Gulf of Aden, the Andaman Sea, the Bay of Bengal, Indonesia, the Philippines, and Japan. Depths between 170 and 1 000 m. More abundant between 500 and 750 m (CROSNIER & JOUANNIC, 1973).

Nephropsis carpenteri Wood-Mason, 1885

Figs 5 f, 11 e-f, 12, 16 f

Nephropsis carpenteri Wood-Mason, 1885 : 70. — ALCOCK & ANDERSON, 1894 : 161 ; 1896 : pl. 27, figs 2, 2 a. — BOUVIER, 1925 : 412. — GEORGE & RAO, 1966 : 333. — BURUKOVSKY, 1973 : 109 (key) (ed. 1983 : 154). — PHILLIPS *et al.*, 1980 : 66.

Nephropsis Carpenteri - ALCOCK, 1899 : 33 ; 1901a : 158 (key), 160. — THOMPSON, 1901 : 17. — BALSS, 1914 : 83 ; 1925 : 208. — DE MAN, 1916 : 97, 112 (key). — BOUVIER, 1917 : 20.

MATERIAL EXAMINED. — **India**. Bay of Bengal, 357 m : 1 ♂ 30 mm ; 1 ♀ 42 mm (BMNH 1894. 5.4.4). — *Ibidem*, 353 m : 1 ♀ 38 mm (USNM). — Cochin, 24.03.1979 : 1 ♀ 40 mm (RMNH).

Burma. SW Rangoon, 250-320 m : 1 ♀ ov. 41 mm (RMNH 35849).

DESCRIPTION. — Carapace globose, with some small, scattered granules, more densely packed on the anterior half. Rostrum bearing only one lateral spine per side. Rostral length 0.3 times the length of the rest of the carapace. Spines moderately strong and placed slightly before or at the midpoint of the rostrum. Median groove slightly overreaching the lateral spines. Subdorsal carinae finely granulate, without spines. A supraorbital and an antennal spine similar to the rostral spines in size. No trace of a second postsupraorbital spine behind the supraorbital spine. Distance between the level of the supraorbital spines and the gastric tubercle, measured along the median line of the carapace, about one-third the distance between the gastric tubercle and the postcervical groove. Postcervical, cervical, and hepatic grooves distinct. Postcervical groove failing to pass the midline of tbe carapace. Lateral and intermediate carinae not very conspicuous.

Abdomen finely granulate and pubescent, with short setae, no spines on tergites and pleura. A low, median carina slightly visible on the second to sixth somites. Anterior margins of pleura granulate and spineless. Pleuron of first abdominal somite low and rounded. Anterior margin of pleuron of second abdominal somite rounded, terminating in a brief, rounded point. Anterior margins of the tbird to fifth somites convex, ending in an acute point.

Chelipeds granulate, heavily setose on the outer surface, especially on the chela and the carpus. Anterior border of merus bearing two spines, one on the outer border and another on the ventral border. One strong spine on the inner anterior margin. Carpus with one-three spines medially on the upper border. Anterior border witb two spines, one dorsally and one ventrally. Sometimes a spine on the outer surface somewhat behind the midpoint of the anterior margin. A strong spine on the inner anterior margin near the articulation with the palm.

Carpus of second pereiopod more than two-thirds palm lengtb. Carpus of third pereiopod around 1.5 times longer than the palm. Propodus of fourth pereiopod twice as long as tbe dactylus.

Coxal process of second pereiopod of males and females gently rounded. Coxal process of third pereiopod of males slightly flattened, with one spine near the articulation with the basis and another spine medially on the posterior border. In females a single spine near the articulation with the basis.

Thelycum of females raised, with the anterior border split into two lobes separated by a wide incision. Incision on posterior border wider than that on the anterior border.

Exopod of uropod with a distinct diaeresis. Outer border of exopods and endopods ending in a spine.

REMARKS. — *Nephropsis carpenteri* is closely related to *N. aculeata* Smith and *N. rosea* Bate from the Western Atlantic. All three species have a single pair of lateral spines on the rostrum, a median carina on the second to fifth abdominal tergites, a diaeresis on the exopod of the uropod, and a smooth, spineless anterior border of the pleuron on the second abdominal segment.

However, *N. carpenteri* can be differentiated from *N. aculeata* by the following characters :

(a) Rostrum about one-half the rest of the carapace in *N. aculeata*, one-third in *N. carpenteri*.

(b) Dorsorostral carina and median groove of rostrum more conspicuous in *N. aculeata*.

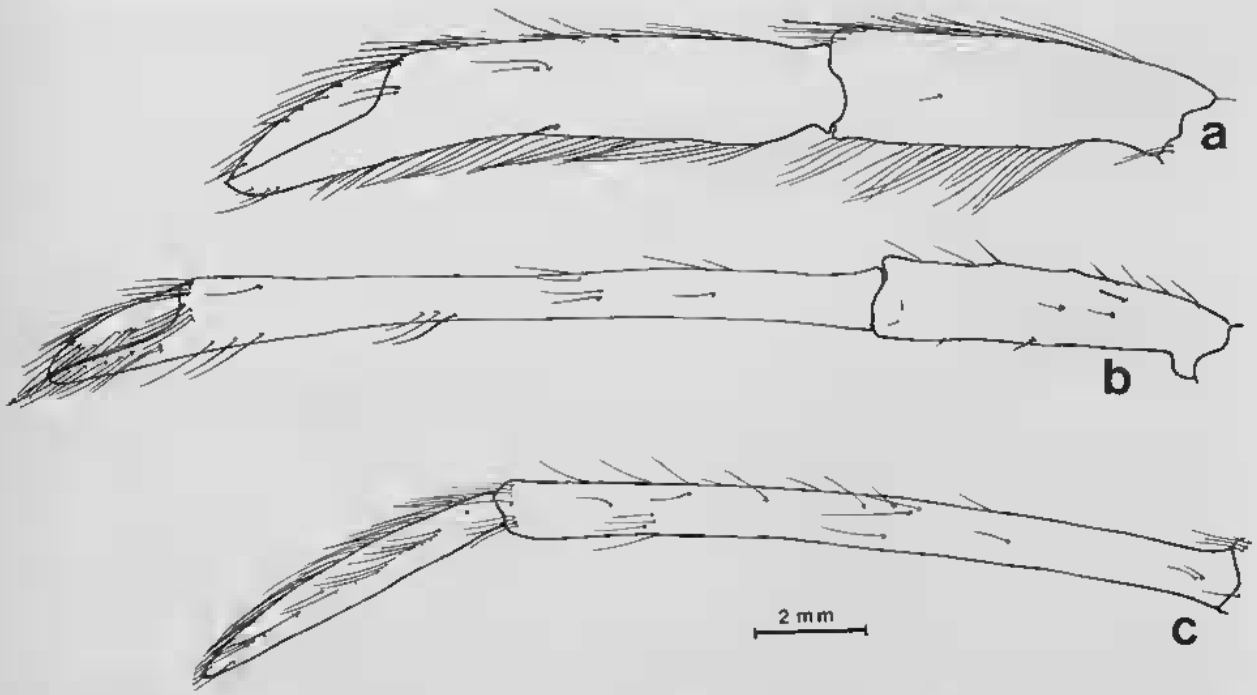

FIG. 12. — *Nephropsis carpenteri* Wood Mason, ♂ 30 mm, Bay of Bengal, 357 m (BMNH 1894.5.4.4) : a, second pereiopod ; b, third pereiopod ; c, fourth pereiopod.

(c) Anterior borders of pleura of second to fifth abdominal segments ending in a long, sharp point in *N. aculeata*, clearly more rounded, ending in a brief point, in *N. carpenteri*.

(d) Merus and carpus of first chelipèd bearing more spines in *N. aculeata*.

(e) Carpus of second pereiopod shorter than the palm in *N. carpenteri*, longer in *N. aculeata*.

N. carpenteri can be differentiated from *N. rosea* by the following characters :

(a) Distance between the supraorbital spines and the gastric tubercle about one-third the distance between the gastric tubercle and post-cervical groove in *N. carpenteri*, more than one-half in *N. rosea*.

(b) A postsupraorbital spine behind the supraorbital spine present in *N. rosea*, absent in *N. carpenteri*.

SIZE. — The male examined measures 30 mm, the females between 40 and 42 mm.

DISTRIBUTION. — Known only from the Bay of Bengal at depths of 250-503 m.

Nephropsis malhaensis Borradaile, 1910

Figs 13 a-b, 14 c-d

Nephropsis malhaensis Borradaile, 1910 : 262. — DE MAN, 1916 : 97, 111 (key). — BOUVIER, 1917 : 21. — BALSS, 1925 : 208. — BURUKOVSKY, 1973 : 110 (key) (ed. 1983 : 154). — PHILLIPS *et al.*, 1980 : 66.

Nephropsis malhaersis - BOUVIER, 1925 : 409 (erroneous spelling).

MATERIAL EXAMINED. — **Indian Ocean : Saya de Malha**, 555-925 m : 1 ♀ holotype, 25 mm (CMCr 117).

DESCRIPTION. — Carapace finely granulate. Rostrum somewhat less than one-half the length of the rest of the carapace, with two lateral spines on the left side and only one on the right, on the proximal half of the rostrum. Median groove overreaching the anterior pair of lateral spines. Two subdorsal carinae more or less granulate, each with a spine smaller than the lateral rostral spines placed above the supraorbital spines. Latter strong and the same size as the

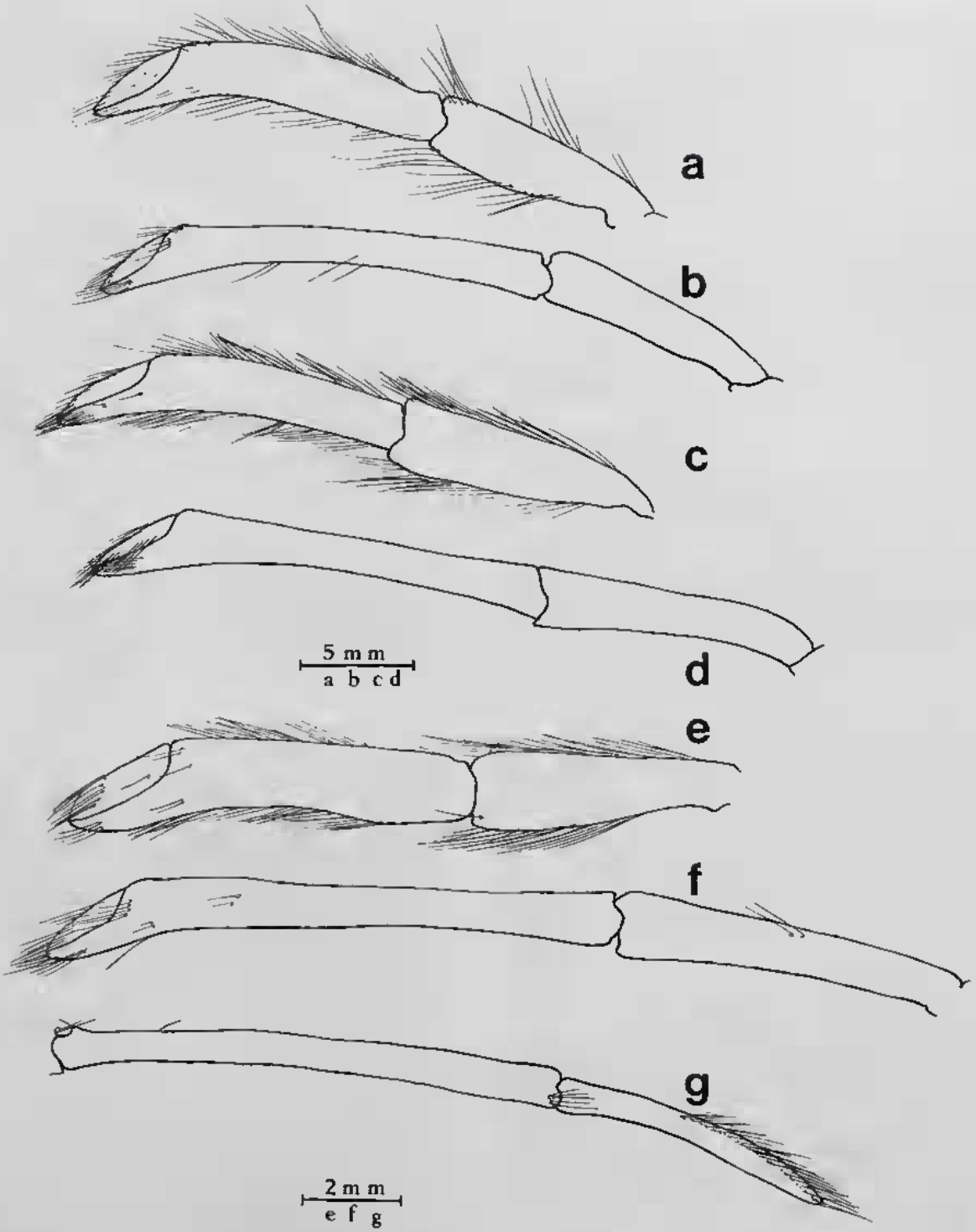

FIG. 13a-b. — *Nephropsis malhaensis* Borradaile, holotype ♀ 25 mm, Saya de Malha, 555-925 m (CM-CT 117) : a, second pereiopod ; b, third pereiopod.

FIG. 13c-d. — *Nephropsis atlantica* Norman, ♂ 25 mm, Triton Expedition, Faeroe Channel (BMNH) : c, second pereiopod ; d, third pereiopod.

FIG. 13e-g. — *Nephropsis sulcata* sp. nov., holotype ♂ 30 mm, MUSORSTOM 2, Philippines, Stn 56, 970 m (MNHN-AS 523) : e, second pereiopod ; f, third pereiopod ; g, fifth pereiopod.

antennal spine. One small postsupraorbital spine behind the supraorbital spine. Distance between the level of the supraorbital spines and the gastric tubercle, measured along the median line, 0.6 times the distance between the gastric tubercle and the postcervical groove. Intestinal tubercle high. Intermediate and intestinal carinae faint, lateral carina rather indistinct. Postcervical, cervical, and hepatic grooves distinct. Dorsomedian groove with two bumps (gastric and intestinal granules).

Abdomen finely granulate, without spines. No distinct median carina visible on 2nd to 6th somites. A more highly raised carina extending along the base of each pleuron. Terga and pleura without pubescence. Pleuron of first abdominal segment with a small, rounded anterior lobe. Anterior margin of second pleuron convex, with one small spine on the basal half. All pleura terminating in long, sharp points and bearing small granules on the margins. Sixth segment with an acute spine on the posterior surface of the pleuron.

First pair of pereiopods not setose. Merus with one anterodorsal and one anteroventral spine, similar in size. Carpus also bearing an anterodorsal and an anteroventral spine. On the outer surface two more spines a short distance behind the anterior margin, one closer to the anterodorsal spine and one closer to the anteroventral spine; an additional spine behind the upper of these two spines. A single spine present on the upper half of the inner surface some distance behind the anterior margin. Carpus of second pereiopod 0.8 times palm length. Carpus of third pereiopod slightly longer than one-half palm length. Dactylus of fifth pereiopod 0.6 times propodus length.

Thelycum of females raised. Posterior incision narrow. Two widely separated, longitudinal ridges in front the thelycum between the bases of the 2nd and 3rd legs.

Exopod of uropod with a distinct diaeresis. Outer lobe of uropodal protopod blunt, inner lobe bearing a slender spine.

REMARKS. — *Nephropsis malhaensis* is known exclusively from the type specimen, caught on the Saya de Malha Bank. No other specimen has yet been captured, and hence possible variations in its specific characters are still unknown.

N. malhaensis is close to *N. atlantica* Norman from the Eastern Atlantic and to *N. sulcata* sp. nov. from the Indian Ocean and Western Pacific. All three species have two pairs of lateral spines on the rostrum (the only known specimen of *N. malhaensis* has one of the four spines missing, fig. 14 c) and a diaeresis on the exopod of the uropod. Nevertheless, *N. malhaensis* can be readily differentiated from both these species by the absence of median carinae on the tergites of the 2nd to 5th abdominal segments, which are conspicuously present in the other species.

The most constant of the four differences with respect to *N. atlantica* pointed on by BORRADAILE (1910) is the absence of the median abdominal carinae, since the pubescence of the body and the spinulation of the carapace are subject to a certain amount of variation in *N. atlantica* (as is also the case in *N. sulcata*). The spinulation of the carapace in *N. malhaensis* is more similar to that observed in the specimens of *N. sulcata* taken off Madagascar. Moreover, the carpus of the second pereiopod is shorter than the length of the palm in *N. malhaensis*, equal to or slightly longer than the palm in *N. atlantica*. Additionally, the carpus of the third pereiopod is slightly longer than one-half of the palm length in *N. malhaensis*, but nearly 0.8 times palm length in *N. atlantica*.

The absence of median abdominal carinae relates this species to *N. stewarti* Wood-Mason, but this latter has only a single pair of lateral spines on the rostrum, and the anterior border of the pleuron of the second abdominal segment is smooth and distinctly more convex.

SIZE. — The only specimen caught to date is a female with a carapace length of 25 mm.

DISTRIBUTION. — Known only from the Saya de Malha Bank in the Southwestern Indian Ocean at depths of 555-925 m.

Nephropsis sulcata sp. nov.

Figs 13 e-g, 14 a-b, 15 a-b, 16 g

Nephropsis atlantica - WOOD-MASON, 1891 : 197, fig. 4. — ALCOCK 1894 a : 230; 1899 : 33; 1901 a : 158 (key). — ALCOCK & ANDERSON, 1894 : 162. — ANDERSON, 1897 : 96. — STEBBING, 1902 a : 34; 1902 b : 130; 1910 : 379. — GILCHRIST, 1918 : 48. — VON BONDE,

FIG. 14a-b. — *Nephropsis sulcata* sp. nov., holotype ♂ 30 mm, MUSORSTOM 2, Philippines, Stn 56, 970 m (MNHN-AS 523) : Anterior part of the abdomen : a, dorsal view ; b, lateral view.

FIG. 14c-d. — *Nephropsis malhaensis* Borradaile, holotype ♀ 25 mm, Saya de Malha, 555-925 m (CM-CR 117) : c, anterior part of the carapace, dorsal view ; d, anterior part of the abdomen, dorsal view.

1932 : 59. — VON BONDE & MARCHAND, 1935 : 6. — BARNARD, 1950 : 530, fig. 99 b-e ; 1964 : 12. - BRUCE, 1966 d : 223. — KENSLEY, 1981 : 29 (not Norman, 1882).

MATERIAL EXAMINED. — **Madagascar.** *Vauban* : CH 102, 22°20.3' S-42°59' E, 995-1 020 m, 29.11.1973 : 3 ♀ 19 to 30 mm ; 1 ♀ ov. 26 mm (MNHN-AS 493). — CH 124, 17°40' S-43°12' E, 1 075-1 115 m, 15.01.1975 : 9 ♂ 19 to 26 mm ; 7 ♀ ov. 26 to 28 mm ; 10 ♀ 22 to 29 mm (MNHN-AS 490).

Philippines. MUSORSTOM 1 : stn 49, 750-925 m : 1 ♂ 15 mm ; 1 ♀ 23 mm (MNHN-AS 524).

MUSORSTOM 2 : stn CP 50, 810-820 m : 1 ♀ 31 mm (MNHN-AS 518). — Stn CP 55, 825 m : 1 ♀ 19 mm (MNHN-AS 519). — Stn CP 56, 970 m : 2 ♂ 27 and 30 mm (MNHN-AS 523, 545).

MUSORSTOM 3 : stn CP 116, 804-812 m : 1 ♂ broken (MNHN-AS 521).

Albatross : stn 5445, 12°44'42" N-124°59'50" E, 708 m, 03.06.1909 : 1 ♂ 32 mm ; 1 ♀ 37 mm (USNM).

Chesterfield Islands. MUSORSTOM 5 : stn CP 386, 755-770 m : 1 juv. 14 mm (MNHN-AS 520). — Stn CP 387, 650-660 m : 1 ♂ 18 mm (MNHN-AS 522).

New Caledonia. BIOCAL : stn CP 75, 22°19' S-167°23' E, 825-860 m, 04.09.1985 : 1 ♂ 24 mm (MNHN-AS 525).

BIOGEOCAL : stn CP 232, 21°33.81' S-167°27.07' E, 760-790 m, 12.04.1987 : 3 ♂ 26 to 34 mm ; 4 ♀ 20-36 mm (MNHN-AS 530).

Australia. CIDARIS 1 : stn 49-3, 17°51.71' S-148°39.09' E, 881-920 m, 09.05.1986 : 1 ♀ ov. 36 mm ; 2 ♀ 29 and 39 mm (JCU).

Laccadive Sea. *Investigator* : stn 105, 15°02' N-73°34.6' E, 1 369 m : 1 ♂ 35 mm (USNM).

TYPES. — One male from Stn CP 56 (MUSORSTOM 2) with a carapace length of 30 mm (MNHN-AS 523) has been selected as the holotype. The female from Stn CP 50 (MUSORSTOM 2) with a carapace length of 31 mm (MNHN-AS 518) is the allotype. The remaining specimens are paratypes.

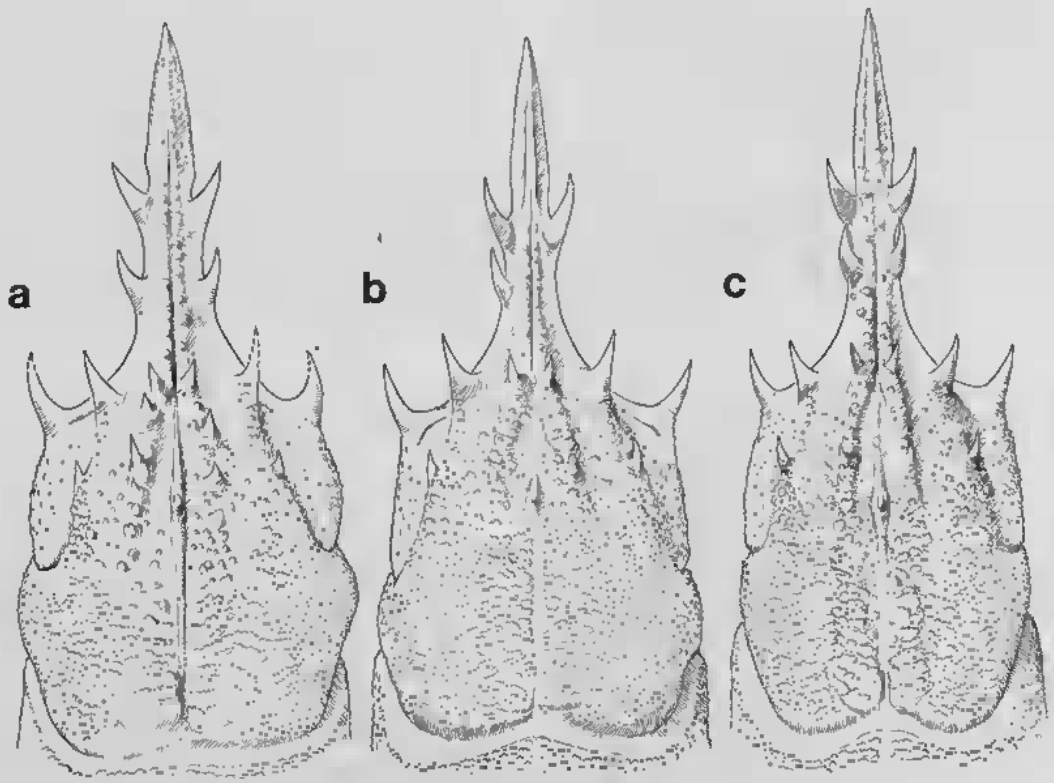

FIG. 15. — Anterior part of the carapace, dorsal view : a, *Nephropsis sulcata* sp. nov., holotype ♂ 30 mm, MUSORSTOM 2, Philippines, Stn 56, 970 m (MNHN-AS 523) ; b, *Ibidem*, paratype ♂ 26 mm, *Vauban*, Madagascar, CH 124, 1 075-1 115 m (MNHN-AS 490) ; c, *N. atlantica* Norman, ♂ 29 mm, *Talisman*, North Atlantic, 1 238 m (MNHN-AS 70) : Anterior part of the carapace, dorsal view.

DESCRIPTION. — Carapace smooth with small granules, sparsely pubescent. Rostrum bearing two pairs of strong lateral spines; the anteriormost pair situated in the middle of the rostrum; the second pair located between the first pair and the supraorbital spines. Median groove overreaching the terminal pair of lateral rostral spines. Rostrum length slightly more than one-half the rest of the carapace. Terminal portion of subdorsal carina on each side finely granulate. Each carina with 6-7 spines of different sizes, the strongest placed at the level of the supraorbital spine and the posteriormost placed at the level of the gastric tubercle. Distance between the level of the supraorbital spines and the gastric tubercle, measured along the median line of the carapace, slightly less than one-half that between gastric tubercle and the postcervical groove. Postorbital spine well-developed, stronger than the post-supraorbital spine. Antennal spine outwardly directed. Postcervical and hepatic grooves deep. Postcervical groove crossing the median line of the carapace. Intermediate and median carinae somewhat raised, lateral carina well-defined.

Second to sixth abdominal somites with a quite distinct median carina. Anterior margins of the pleura of the 2nd to 5th somites convex, each ending in a long, sharp point. One-two spines on the anterior margin of the second somite; anterior margins of subsequent somites serrate. A spine on the posterior border of the fifth somite. Posterolateral angle of sixth somite bearing a spine.

Carpus of first pereiopod with a large anterodorsal spine and a smaller anteroventral spine. A strong dorsal spine on the terminal border of the carpus. Two anteroventral spines, one on the outer margin, one on the inner margin. Outer surface bearing a spine on the terminal half; two spines on the inner surface. Carpus somewhat shorter than the palm. Chela more or less elongate. All articles bearing numerous small granules. Abundant pubescence, longer on the fingers, but articulations, spines, and granules

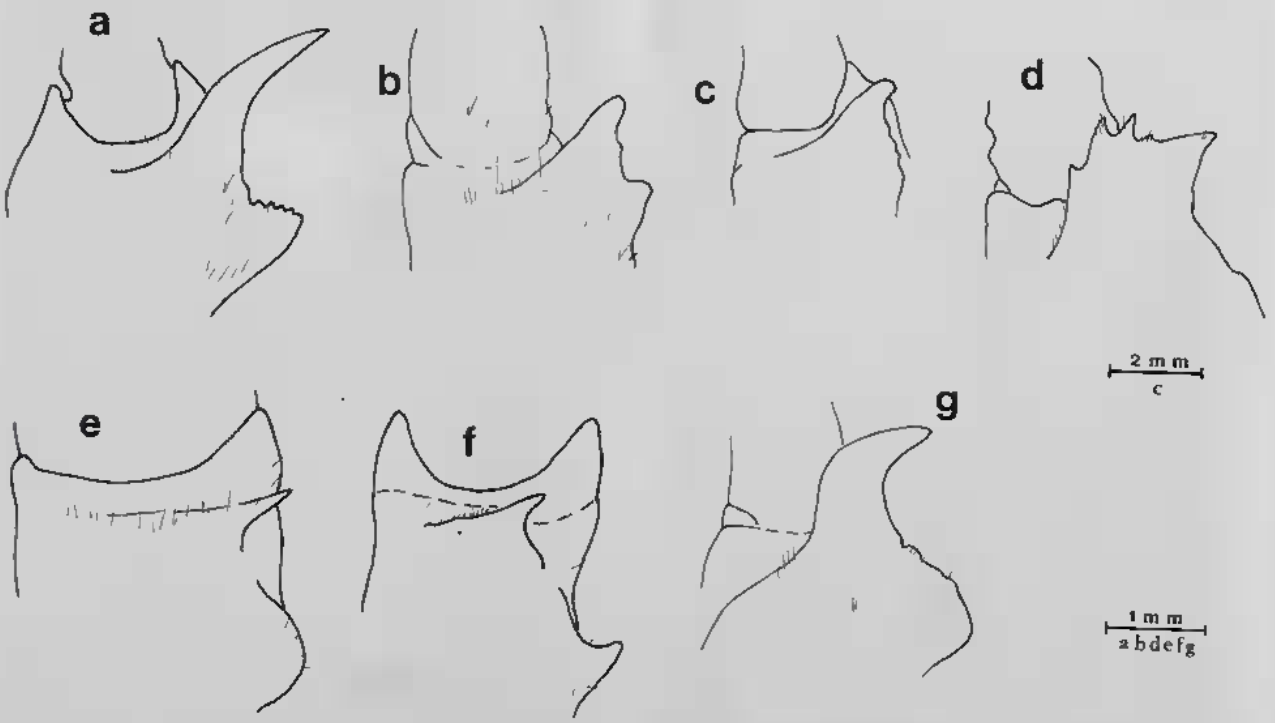

FIG. 16. — Coxa of the third left pereiopod : a, *Nephropsis ensirostris* Alcock, ♂ 26 mm, MUSORSTOM 3, Philippines, Stn CP 128, 815-821 m (MNHN-AS 494); b, *N. suhmi* Bate, ♂ 31 mm, BIOCAL, New Caledonia, Stn CP 69, 1 220-1 225 m (MNHN-AS 509); c, *N. occidentalis* Faxon, ♂ 43 mm, *Albatross*, Mexico, Stn. 3418, 1 221 m (RMNH 25623); d, *N. acanthura* sp. nov., ♂ 30 mm, MUSORSTOM 5, New Caledonia, Stn CP 323, 970 m (MNHN-AS 517); e, *N. stewarti* Wood Mason, ♂ 39 mm, *Vauban*, Madagascar, CH 33, 600-605 m (MNHN-AS 435); f, *N. carpenteri* Wood Mason, ♂ 30 mm, Bay of Bengal, 357 m (BMNH 1894.5.4.4); g, *N. sulcata* sp. nov., holotype ♂ 30 mm, MUSORSTOM 2, Philippines, Stn 56, 970 m (MNHN-AS 523).

clearly visible. Carpus of second pereiopod shorter than the palm. Carpus of third pereiopod 0.7 times palm length. Dactyli of fourth and fifth legs 0.5-0.6 times propodus length.

Process on coxa of second pereiopod rounded. Process on coxa of third pereiopod of males ending in a strong, curved spine.

Thelycum of females raised, bisected anteriorly by a median groove. Posterior incision wide.

Uropodal exopod bearing a distinct and complete diaeresis, with a spine on the outer border. Outer lobe of the uropodal protopodite ending in a spine.

VARIATIONS. — In the specimens collected off Madagascar, the surface of the carapace tends to be very smooth, and the spines on the carapace are less well-developed than those on the specimens caught in the Pacific Ocean. A certain degree of variability has, even so, been observed between specimens from the same locality.

REMARKS. — *N. sulcata* belongs to the group of species with two pairs of lateral spines on the rostrum, a diaeresis on the uropodal exopod, and a median carina on the 2nd to 6th abdominal somites. The closest species is *N. atlantica* Norman, from the Eastern Atlantic Ocean. Comparison of the material of this new species examined with specimens of *N. atlantica* (6 ♂, 1 ♀, RMNH 28740 ; 3 ♂, RMHN 29389 ; 2 ♀, RMNH 11381 ; 5 ♂, 7 ♀, RMNH 29391 ; 2 ♀, MNHN-AS 69 ; 1 ♂, MNHN-AS 174 ; 1 ♂, MNHN-AS 183 ; 2 ♀, MNHN-AS 156 ; 2 ♂, MNHN-AS 70 ; 1 ♀, MNHN-AS 68 ; 1 ♀, MNHN-AS 157 ; 1 ♀, MNHN-AS 176 ; 1 ♂, MNHN-AS 180 ; 1 ♂, BMNH 98.5.7 ; 1 ♀, BMNH 1910.2.4.85 ; 2 ♀, 1 ♂, ICM 1033 ; 1 ♀, 2 ♂, ICM 1034) shows both species to be readily differentiable (Figs 13 c-d, 15 c). The differences are as follows :

(a) Median groove on rostrum clearly overreaching the distal pair of lateral rostral spines in *N. sulcata*, reaching only to the proximal pair of lateral spines in *N. atlantica*.

(b) Carpus of second pereiopod shorter than the palm in *N. sulcata*, as long as the palm in *N. atlantica*.

(c) Distance between the postsupraorbital spine and the gastric tubercle about 0.6 times the distance between the gastric tubercle and the postcervical groove in *N. atlantica*, less than 0.5 times in this new species.

(d) Median carinae on abdominal somites more distinct in the new species.

ETYMOLOGY. — The name *sulcata* comes from the Latin " sulcus ", furrow or groove, in reference to the median groove on the rostrum.

SIZE. — The males examined ranged from 15 to 30 mm, the females from 18 to 34 mm. Ovigerous females from 26 mm.

DISTRIBUTION. — Southwestern Indian Ocean, Laccadive Sea, South China Sea, Philippines, New Caledonia. Muddy bottoms at depths between 750 and 1 115 m.

GENERAL REMARKS ON THE INDIAN AND PACIFIC SPECIES OF THE GENUS *NEPHROPSIS*

The systematic history of the genus *Nephropsis* can be traced through the works of ALCOCK (1901), DE MAN (1916) and BOUVIER (1917). Our current understanding of the genus is largely due to the revision of HOLTHUIS (1974).

The genus contains 13 species. The great majority are restricted to depths greater than 400 m (Fig. 4). Studies on this genus have consistently found that the use of a few clearly defined characters provided a basis for a classification that has been both reliable and stable. Thus most *Nephropsis* species are clearly defined and easily distinguished from one to another. The principal characters used to distinguish the species are : spines on the rostrum, position of the gastric tubercle, diaeresis of the exopod of the uropod, median abdominal carina and spines on the anterior margin of the abdominal pleura.

The 8 species present in the Indian and Pacific Oceans are quite differentiated and several groups are observed :

(a) *N. occidentalis* Faxon - *N. acanthura* sp. nov.

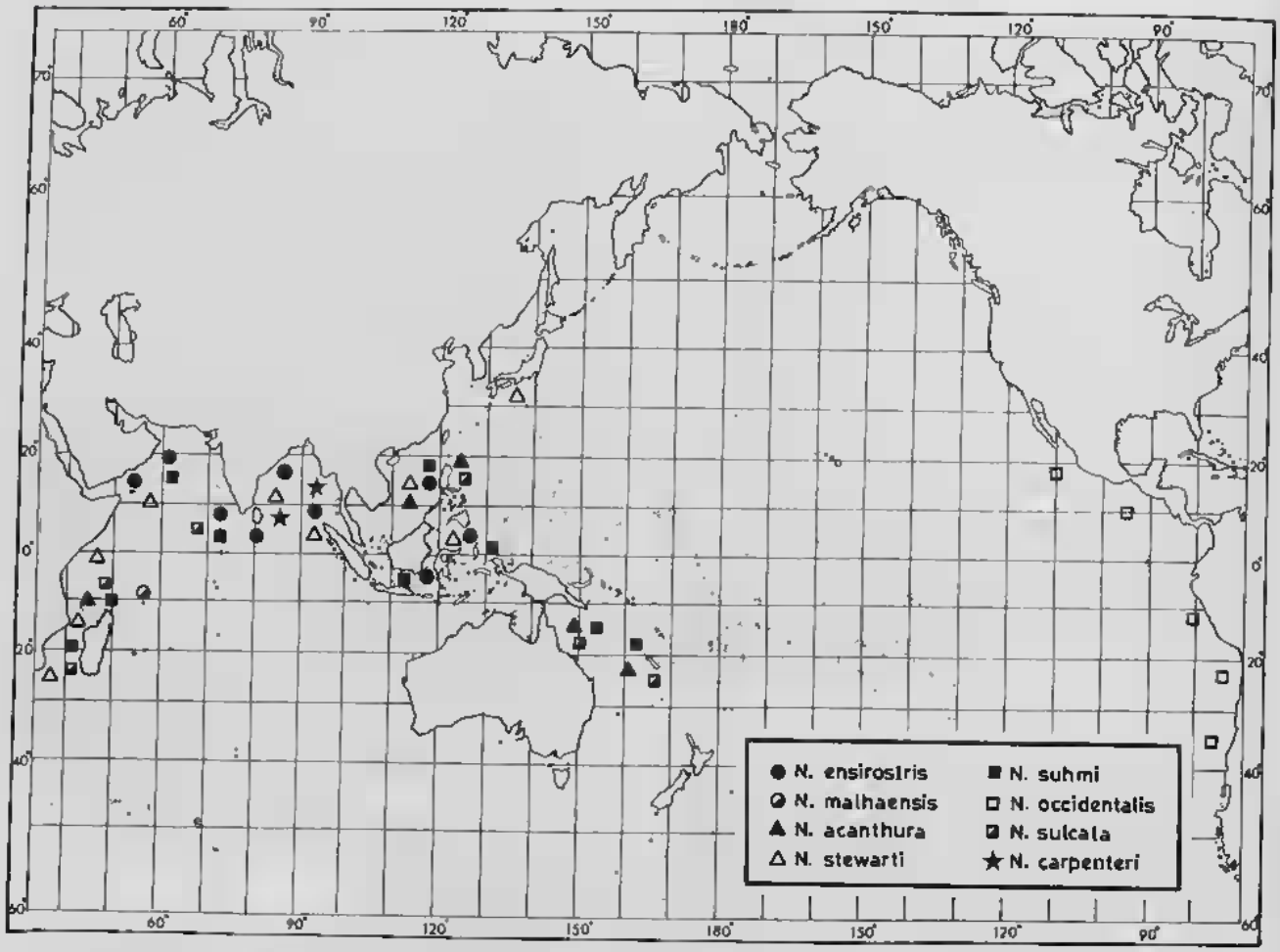

FIG. 17. — Distribution of the species of the genus *Nephropsis* in the Indian and Pacific Oceans.

(b) *N. stewarti* Wood Mason - *N. carpenteri* Wood Mason

(c) *N. malhaensis* Borradaille - *N. sulcata* sp. nov.

(d) Two isolated species : *N. ensirostris* Alcock and *N. suhmi* Bate.

Most species are easily distinguishable from the Atlantic species. The only exception is *N. suhmi*, morphologically very close to *N. agassizii* Smith from the Western Atlantic. The other problematic species is *N. malhaensis*, known exclusively from the type specimen. Although these species are differentiated, a future research with additional material would be desirable.

A zoogeographic evaluation of the *Nephropsis* species from the Indian and Pacific waters at the present time can only be tentative because of the paucity of distributional information on several areas (e.g. Australia, central Pacific). However, based on the geographic distribution of the 8 species some general observations can be made (Fig. 17). Two zoogeographic zones are clearly found : Eastern Pacific (*N. occidentalis*) and Indo-West Pacific (other species). With the exception of two species with restricted geographic distribution (*N. malhaensis* and *N. carpenteri*) the other species have a wide occurrence in the Indian and Western Pacific Oceans.

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